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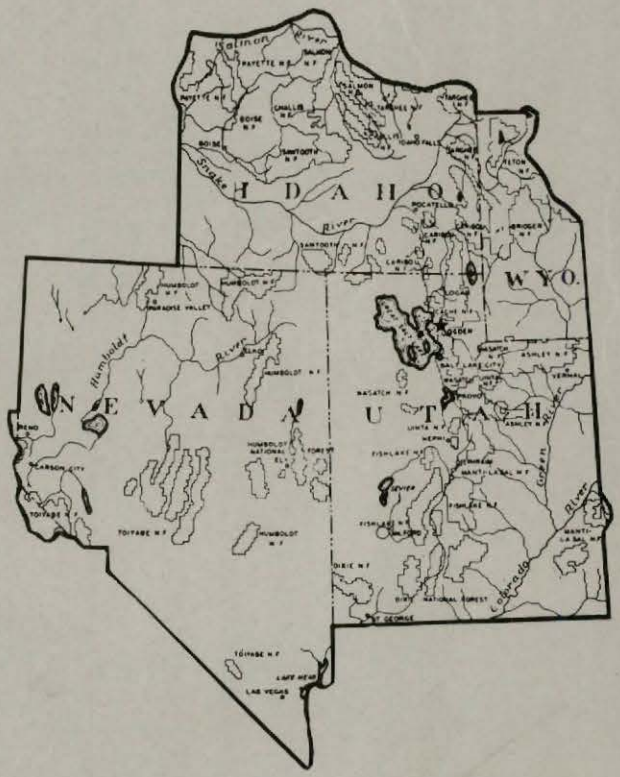
MOUNTAIN PINE BEETLE CONDITIONS

FOREST SERVICE REGION 4

November 1963



BRANCH OF FOREST INSECT AND DISEASE
PREVENTION AND CONTROL

DIVISION OF TIMBER MANAGEMENT

Forest Service
U. S. Department of Agriculture
Ogden, Utah

MOUNTAIN PINE BEETLE CONDITIONS
FOREST SERVICE REGION 4

November 1963

INTRODUCTION

This report presents evaluation data on infestations of the mountain pine beetle (Dendroctonus monticolae Hopk.) in lodgepole and ponderosa pine stands on lands of all ownerships in the territory included within the boundaries of U. S. Forest Service, Region Four. The Intermountain Region (Four) territory encompasses all of the states of Utah, Nevada, the western half of Wyoming, and all of southern Idaho.

Mountain pine beetle activity has been increasing at an alarming rate throughout the lodgepole pine forests since 1954. Each year control action has been carried on against one or more of the most aggressive infestations. Several smaller infestations have been reduced to endemic levels by control action, and the epidemic trend on a few has been reversed by natural factors. On a majority of the infestations, however, beetle populations continue to show epidemic tendencies.

To obtain reliable data for the assessment of a particular situation and predict the course of an outbreak, often as many as four examinations per generation are necessary. Unfortunately, it was not possible to visit the majority of the infestations more than twice this year. Field data were supplemented with data obtained from lab rearing of bark beetle populations. Data collected were used to build simple life tables showing changes in brood density between examinations. These data in turn provided the background information to check the validity of the predictions.

Data collected for evaluation and prediction purposes include population measurements from bark samples, detailed descriptions and measurements of stand conditions, and other biological and environmental factors that might affect bark beetle population production and survival.

A discussion of the infestation centers in alphabetical order by National Forests and Parks follows. Infestations on lands other than National Forests or Parks are discussed under the nearest National Forest. Maps showing the location of the centers follow the discussion of the infestations for each forest area.

CURRENT CONDITIONS

Ashley National Forest

Epidemic centers of mountain pine beetle in lodgepole and ponderosa pine have been present on the Ashley National Forest since 1956. Over 8,000 trees were treated this spring on the Forest.

North Slope

About 7,500 lodgepole pine infested with mountain pine beetle were chemically treated on the North Slope during the spring of 1963. The control project materially reduced the bark beetle population within the control boundaries.

Operational surveys showed 200 newly infested trees on about 300 acres in the Cart Creek area. Average d.b.h. of infested trees was 10.5 inches. No ground evaluation has been made.

Other areas containing spot infestations detected by aerial survey, but not yet ground evaluated, are in the vicinity of Mahogany Draw, near Flaming Gorge Dam, northwest of Hickerson Park, in and around Green Lakes, north of Elk Park, and east of Ute Lookout.

South Slope

The largest infestation occurs in Petty Creek, north of Altonah, Utah. Brood densities averaged 208 per square foot of infested bark, higher than necessary to maintain an epidemic condition, but the ratio of pitched-out trees to successfully attacked trees was three or four to one. Many mature and overmature trees have not been attacked within previously infested areas. An operational survey was conducted on this area and approximately 1,500 infested lodgepole pine were found on 850 acres.

In the vicinity of Brown Duck Creek, and west of Moon Lake, near Lake Fork Guard Station, brood densities averaged 190 per square foot of infested bark. Approximately four pitched-out trees were found for each successfully attacked tree; the buildup ratio is less than one to one. Most of the timber throughout this area is pole size, but pockets of mature timber contain scattered infested lodgepole pine trees.

From the entomological viewpoint, although epidemic brood densities are present in Brown Duck-Moon Lake and Petty Creek areas, these outbreaks do not appear to be as aggressive in nature as outbreaks which occurred prior to 1963. There is little danger of heavy loss under present conditions, and these infestations may subside naturally without treatment.

The evaluation in Lime Kiln Spring, northeast of Yellowstone Guard Station, showed 75 to 100 lodgepole pine infested with mountain pine beetle on approximately 500 acres. Brood densities are low and this infestation appears to be on a downward trend. Another evaluation next spring will be necessary to accurately determine the trend of this infestation.

Operational surveys show 580 infested ponderosa pine trees in the Burnt Mill Spring area. The ground evaluation showed approximately four red tops for each new successfully attacked tree. The ratio of pitchouts to trees successfully attack is approximately one to three. Brood densities average 190 per square foot of bark sample. The infestation is classed as epidemic, however, a spring evaluation will be needed to determine the trend.

An evaluation in Timothy Creek shows approximately 600 to 700 lodgepole pine infested with mountain pine beetle. There are about two newly attacked trees to each tree killed last year. Average d.b.h. of attacked trees is 13.2 inches. Brood densities and gallery starts average 199.6 and 14.0 per square foot of infested bark, respectively.

In Cow Canyon, on the west side of Yellowstone Creek, Ashley National Forest personnel estimate 500 lodgepole pine infested with mountain pine beetle on approximately 500 acres. Biological evaluations show an average brood density of 213.8 per square foot of bark sample. The ratio of old to new attacks was estimated to be one to one. Average diameter of infested trees is 11 inches.

Both the Timothy Creek and Cow Canyon infestations have brood densities about the levels necessary to maintain present epidemic trends. The population levels are such that unless brood mortality before next July is greater than normal, there will be an increase in number of attacked trees next year. From the entomological viewpoint, control is justified in Timothy Creek and Cow Canyon.

The huge mountain pine beetle infestation in the Oweep Creek-Lake Fork area in the High Uinta Wilderness Area has continued to increase, both in area and number of faded trees. In the vicinity of Clements Creek there is a definite increasing trend and a wide increase in area infested. This is also true for the upper reaches of Oweep Creek where aerial survey personnel estimate in the neighborhood of three to five new faded trees for each of last year's faders. The increase is even greater toward the center of the infestation. The only decrease in numbers of faded trees is around the point of origin. Here nearly all of the suitable host trees have been killed. No biological evaluation of this infestation has been made.

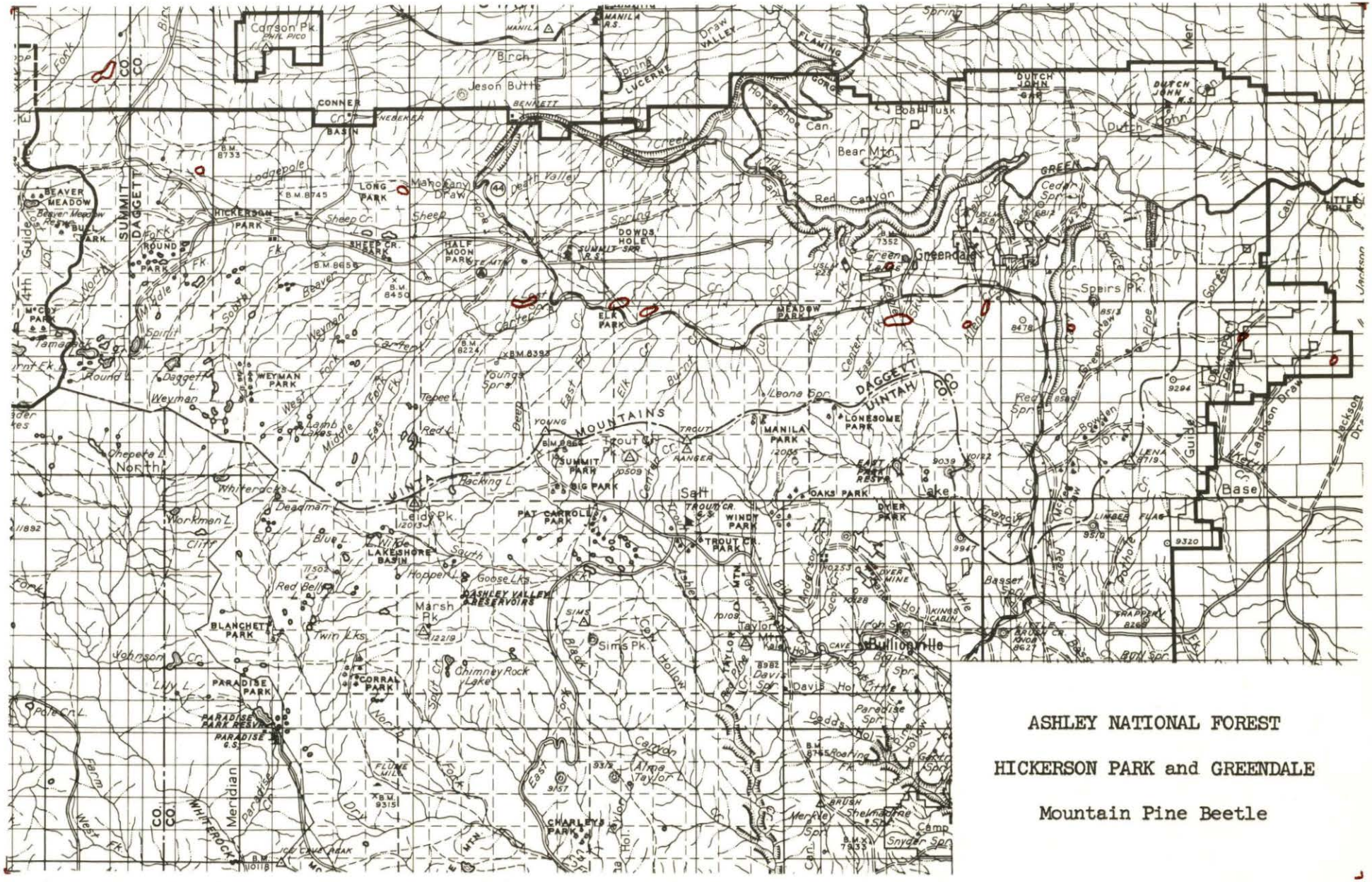
Operational surveys were conducted by Ashley National Forest personnel in Dry Gulch below Heller Lake, Pole Creek, and in the West Fork of Farm Creek. Results were as follows:

Area	No. of Infested Trees	Acres
West Fork of Farm Creek	300	200
Pole Creek	180	390
Dry Gulch	220	530

Evaluations of these areas are scheduled for next spring.

Other mountain pine beetle infestations recorded by aerial survey personnel but not ground evaluated are in Granddaddy Basin, Rock Creek, and McAfee Basin in the High Uinta Wilderness area. The Granddaddy Basin infestation appears to have declined, and aerial survey personnel estimate that the number of faded trees is less than one quarter the number that were present there last year. The infestation in McAfee Basin appears to be increasing, but trees are very scattered and in small groups. There are between 50 to 100 faded trees in this area. The infestation in Rock Creek contains five small groups showing no significant increase over last year.

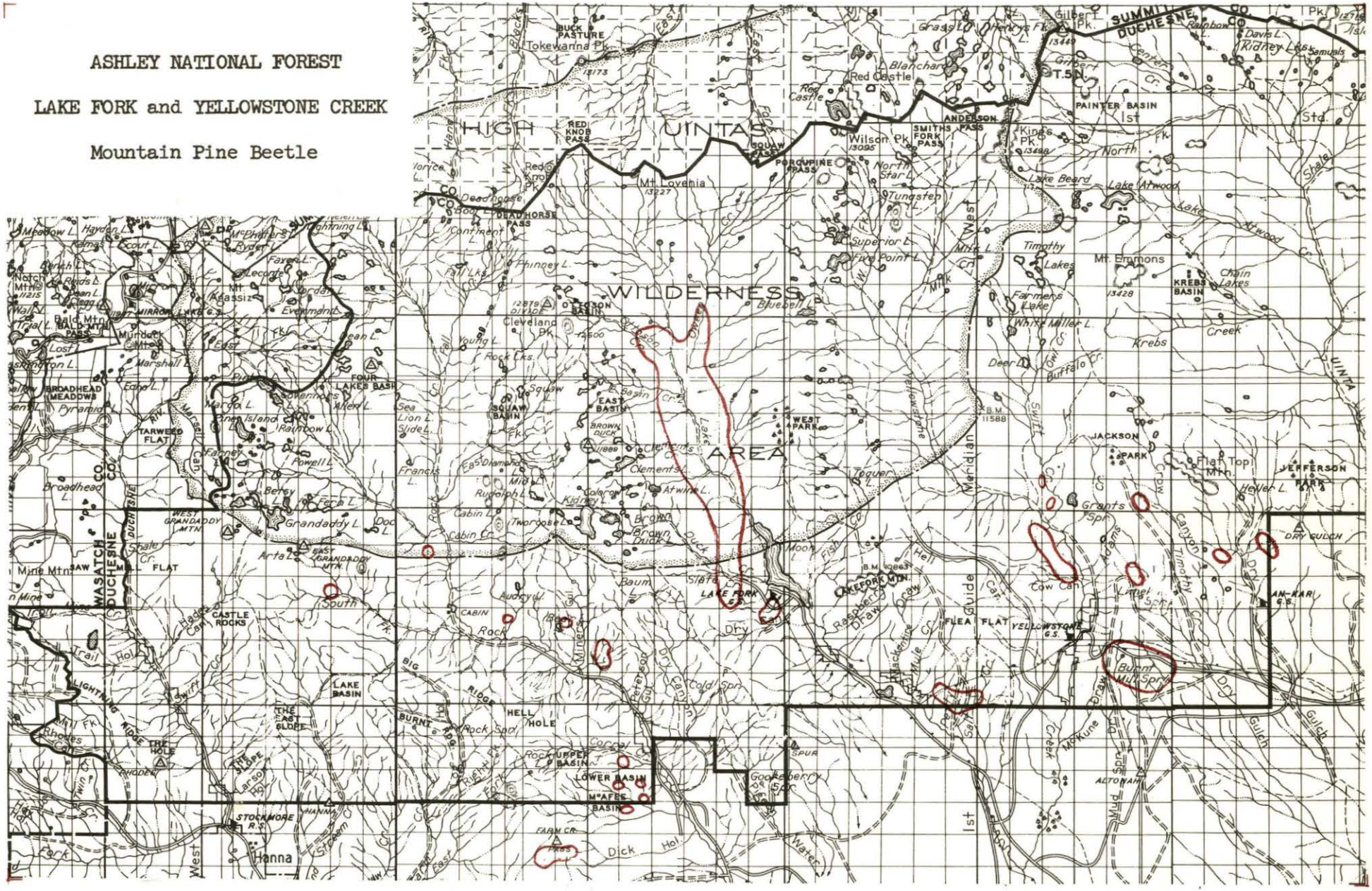
The infestation near the Farm Creek Pass triangulation point on Indian lands appears to be on a downward trend. Ground evaluations show a buildup ratio of less than one to one, and we believe there are now fewer trees infested than there were last year. Brood densities averaged 151 per square foot of infested bark, which is probably below the level necessary to maintain an epidemic condition. There are approximately four "pitchouts" for every newly attacked trees. In all probability, this infestation will continue to decrease in the future.

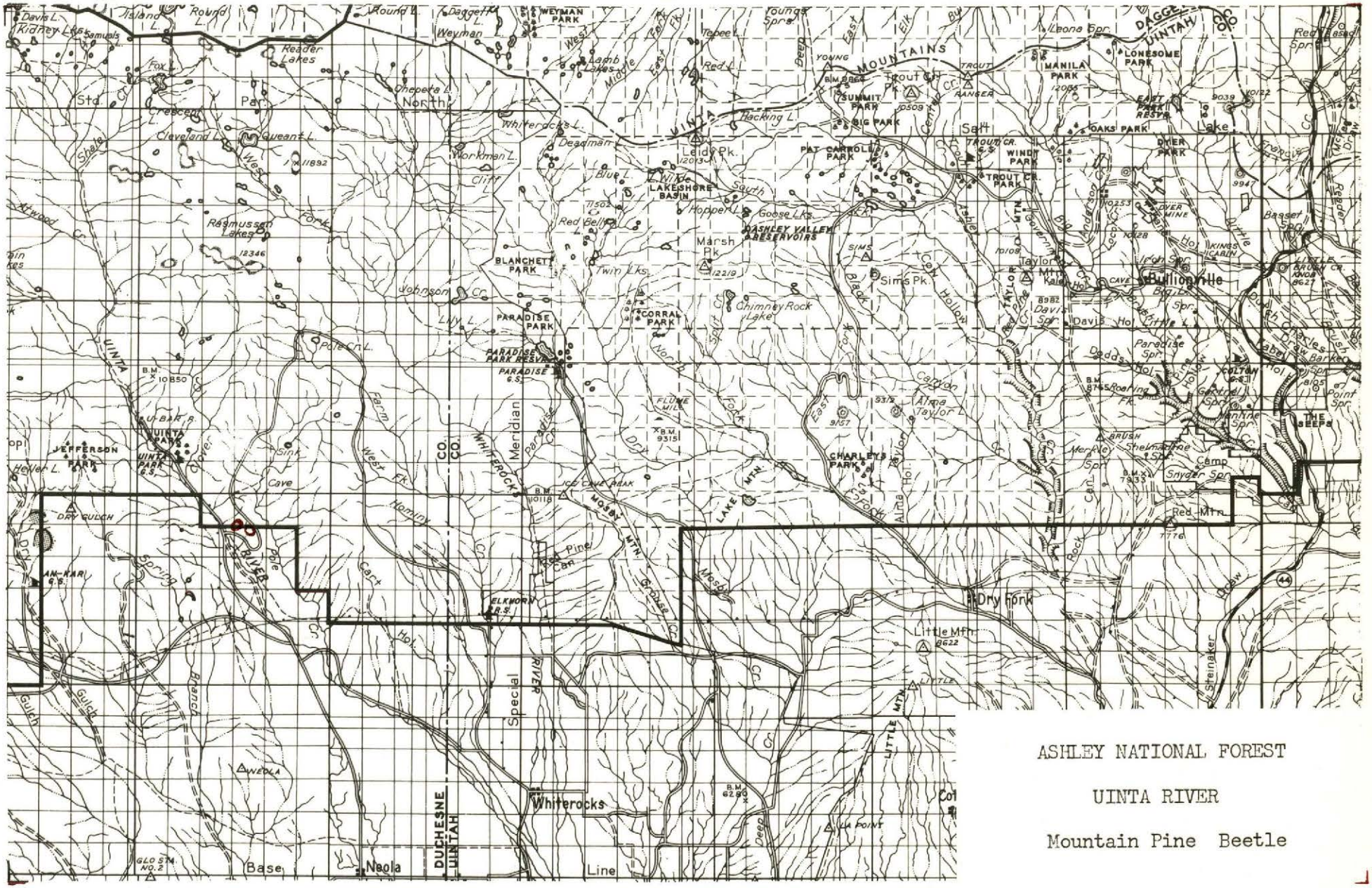

Carson Pk.
PNTL. PICO
MANILA
MANILA R.S.
Birch
Jeson Butte
CONNER
BASIN
BENNETT
Spring
LYCERNE
Draw
VALLEY
FLAMING
GORGE
DUTCH JOHN
G.R.
DUTCH JOHN R.S.
J Boat Tusk
Horseshoe Can.
Bear Mtn
Red Canyon
Dutch John
Can.
Mer
Spring
Cedar Spr
Greendale
Greendale
Spears Pk.
LITTLE HOLE
BEAVER MEADOW
Beaver Meadow
BULL PARK
HICKERSON PARK
LONG PARK
Mahogany Draw
Lodgepole
Sheep Cr.
SHEEP CR. PARK
HALF MOON PARK
DOWDS HOLE
SUMMIT R.S.
SUMMIT
DAGGETT
McCOY PARK
Tamarack L.
Round L.
Daggett L.
Weyman
WEYMAN PARK
Lamb Lakes
Chepeta L.
North
Whiterocks L.
Deadman
Workman L.
Cliff L.
Leidy Pk.
12013
Blue L.
LAKESHORE BASIN
Hoppe L.
Goose Lks.
Red Bell
DASHLEY VALLEY RESERVOIRS
Marsh Pk.
12219
Sims Pk.
Twin Lks.
BLANCHET PARK
Johnson
Lily L.
Pole Cr. L.
PARADISE PARK
PARADISE PARK RESVR.
PARADISE G.S.
CORRAL PARK
Chimney Rock Lake
Meridian
Paradise Cr.
Farm
West Fk.
WHITEROCKS
FLUME HILL
B.M. 9315
ICE CAVE PEAK
B.M. 10118
CHARLEY PARK
Taylor
Sims
Trail
Blacks Fk.
Hollow
East Fk.
9315
9157
Canyon
Alkie Taylor L.
Hol.
MTN.
Taylor Mtn
10109
Taylor Pk
Taylor Flat
Hol.
CAVE
Bullionville
Davis Spr.
Davis Hol.
Little
Paradise Spr.
Dodds Hol.
Roaring Fk.
Brush Creek
Merkley Spr.
Sheepherder Spr.
Camp
Snyder Spr.
B.M. 7935
Spring
Hollow
Gorge
Creek
Ridge
Cedar Spr.
Green Lake
Spring
Pipe
Green River
Gorge
Jackson
Landson Draw
Guide
Lena
Base
Lake
Basset Spr.
Reeder
Pothole
Trapper
Kings Cabin
Iron Spr.
Bdn Spr.
Limber Flag
Mckee Draw
Dyer Mine
Dyer Park
Oaks Park
Lonesome Park
Manila Park
East Park Resvr.
Leona Spr.
Young
Trout Cr.
Ranger
Summit Park
Big Park
Pat Carroll's Park
Trout Cr. Park
Windy Park
Trout Cr. G.S.
Meadow Park
Elk Park
Carter
Youngs Spr.
Tepee L.
Red L.
Recking L.
Burnt
Cub
Center
Deep
Weyman
Carter
Spring
Sheep
Lodgepole
Fork
Middle
South
North
Beaver
Spring
Round
Daggett
Weyman
Lamb
Lakes
Chepeta
Whiterocks
Deadman
Workman
Cliff
Leidy
Blue
Lakeshore
Hoppe
Goose
Red Bell
Dashley
Marsh
Sims
Twin
Blanchet
Johnson
Lily
Pole
Paradise
Corral
Chimney Rock
Meridian
Paradise
Farm
West
Whiterocks
Flume
Ice Cave
Charley
Taylor
Sims
Trail
Blacks
Hollow
East
Canyon
Alkie
Hol.
Mtn.
Taylor
Taylor
Hollow
Gorge
Creek
Ridge
Cedar
Green
Spring
Pipe
Green River
Gorge
Jackson
Landson
Guide
Lena
Base
Lake
Basset
Reeder
Pothole
Trapper
Kings
Iron
Bdn
Limber
Mckee
Dyer
Oaks
Lonesome
Manila
East Park
Leona
Young
Trout
Ranger
Summit
Big
Pat Carroll's
Trout
Windy
Meadow
Elk
Carter
Youngs
Tepee
Red
Recking

ASHLEY NATIONAL FOREST

LAKE FORK and YELLOWSTONE CREEK

Mountain Pine Beetle




ASHLEY NATIONAL FOREST
UINTA RIVER
Mountain Pine Beetle

Boise National Forest

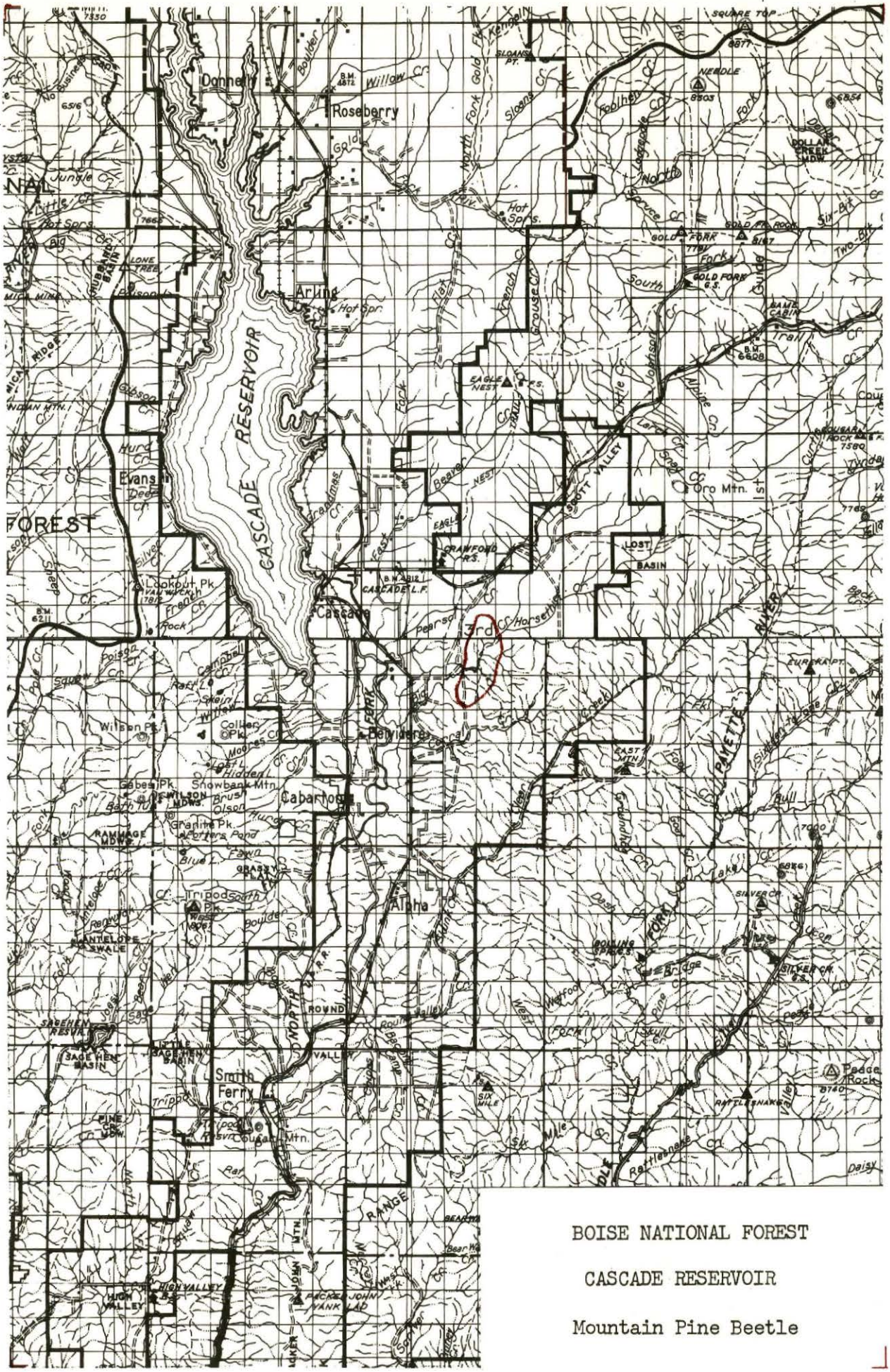
Two mountain pine beetle infestations on the Boise National Forest were reported last year. One was in lodgepole pine and the other in second-growth ponderosa pine. The infestation reported last year in Clear Creek continued its downward trend, as was predicted, and can now be classed as endemic. Only a few scattered faded lodgepole pine were located by the aerial survey observer this year.

The other infestation located in Big Creek southeast of Cascade, Idaho has been active for several years. The infestation is in second-growth ponderosa pine on State and private lands bordering the Boise National Forest. Last year it was estimated there were about 1,000 infested trees, the majority of which were in the six to eight inch d.b.h. class. This year many trees 12 inches d.b.h. and above have been attacked, and it is estimated that altogether there are between 1,500 and 2,000 newly infested trees. Evaluations of the broods beneath the bark of these newly attacked trees show a brood density of only 107 per square foot with an attack density of 6.1 gallery starts per square foot of sample. Sizeable populations of a Medetera parasite were noted. The Medetera population density averaged 34.3 per square foot. In addition to the 1,500 to 2,000 newly infested trees, several hundred faded trees are still supporting mountain pine beetle broods and mature larvae, pupae, and callow adults. Undoubtedly these trees were attacked early this spring. Two attack periods in a single season are rather rare in Region Four.

The faded trees supporting broods appeared to have a lighter coloration--yellowish rather than the normal rust color. The late fall examination revealed the brood density averaged six callow adults and eleven mature larvae per square foot of sample. This brood can be expected to overwinter and attack next spring. How successful the broods in the faded trees will be in surviving the winter months is not known.

The present status of the infestation is concluded to be epidemic with a slight tendency towards an increasing trend. The present light broods of mountain pine beetle and relatively heavy broods of Medetera in the newly attacked trees do not support this contention. However, the rather large number of faded trees now supporting broods, and the fact beetles have moved from six to eight inch d.b.h trees into larger diameter trees tends to support the entomological conclusion.

This infestation will need to be reexamined early next spring for status determination.



BOISE NATIONAL FOREST

CASCADE RESERVOIR

Mountain Pine Beetle

Bridger National Forest

Several small mountain pine beetle infestations are present on the Bridger National Forest. Aerial survey personnel estimate in all infestations only about 2,000 to 2,500 lodgepole pine trees were killed last year, a slight increase over the previous year.

Bridger Division

On the Bridger Division of the Bridger National Forest, mountain pine beetle activity was detected during fall aerial surveys in the following areas: north of New Fork Lakes, southwest of New Fork Lakes, northwest of Willow Creek Guard Station, in and around Willow Lake, and behind the Rim Station.

Ground evaluations were made north of Willow Lake and in the New Fork Lakes infestation. Beetles were in flight at the time these areas were examined, therefore, brood densities could not be measured. Heavier than usual brood mortality throughout the winter occurred on both infestations. Heavy woodpecker work on some trees indicates these birds helped materially in reducing the bark beetle broods. Very few, if any, adults emerged from many of the infested trees. No newly attacked trees could be found in either area at the time evaluations were made, but it is quite possible some trees were attacked after the inspection. Approximately 15 to 20 percent of the faders had been killed by Ips. Seventy percent or more of the lodgepole in both areas is infected with mistletoe.

In all likelihood, these two infestations will show declines in number of trees attacked next fall.

The other infestations on the Bridger Division have not been evaluated, but are scheduled for examination next spring.

Wyoming Division

The mountain pine beetle infestations on the Wyoming Division detected by fall aerial surveys are summarized below. Unfortunately, it was not possible to evaluate these infestations this fall. They are, however, scheduled to be examined early next spring.

In the head of West Bailey Creek, there are about 150 faders scattered in large groups of 20 or more per group. This infestation shows no significant increase in the number of faders over last year.

There are about 200 to 250 faded trees scattered for a couple of miles along Little Grey's River near the forks of Grey's Guard Station. The beetles appear to have concentrated in the mature and overmature lodgepole pine trees in a mixed stand of lodgepole and Douglas-fir.

Scattered faders were located near Stump Creek, Dead Dog Creek, Porcupine Creek, and on into Grizzly Basin. Aerial surveys indicate between 1,200 and 1,300 faders in these areas. This number of faded trees appears to be an increase over those seen last year. Group sizes are relatively small, averaging about ten trees.

On the flat between Elk Creek and North Three Forks Creeks about 300 to 500 current faders were observed. This is an increase in the number of faders over last year.

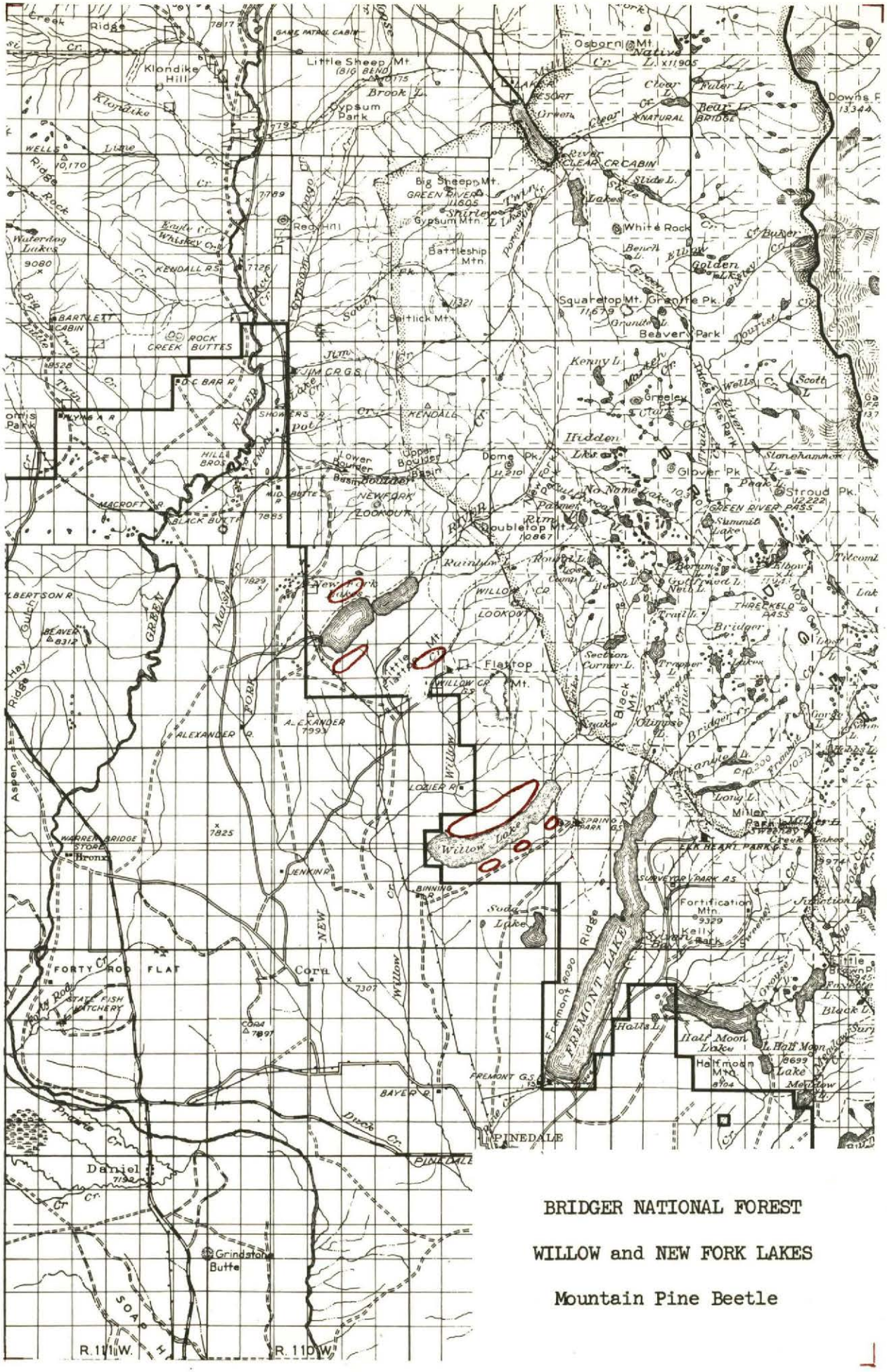
There are about 250 scattered faders throughout the Middle Beaver Creek drainage off Forest land northwest of Bronx, Wyoming. This is in a fringe-type area extending into the sagebrush, and is so isolated that it does not appear to constitute a threat to surrounding Forest land.

The South Piney infestation appears to have increased. There were approximately 200 to 250 trees killed last year.

In the infestation at the head of Carl Creek, mountain pine beetle activity appears from the air to be about the same as last year.

In Mayfield Creek on State and private land, aerial observers estimate 500 lodgepole pine killed last year by mountain pine beetle.

As mentioned before, these areas have not been evaluated, and the status of the infestations will not be fully known until this is done.


Willow Lake
New Fork Lake
Fremont Lake
Half Moon Lake
Little Half Moon Lake
Suds Lake
Trail Lake
Lonely Lake
Miller Lake
Hidden Lakes
Golden Lake
Scott Lake
Kenny Lake
Beaver Park
Granite Pk.
Squaretop Mt.
Battleship Mtn.
Gypsum Mtn.
Big Sheep Mt.
Little Sheep Mt
Osborn Mt.
Native Mt.
Klondike Hill
Gypsum Park
Rock Creek Buttes
Black Butte
Mid Butte
Newfork Lookout
Willow Cr. Lookout
Flattop Mt.
Doubletop Mt.
Dome Pk.
Glover Pk.
Stroud Pk.
Summit Lake
Green River Pass
Three Peaks Pass
Bridger Mt.
Section Corner L.
Trapper L.
Black Mt.
Fortification Mtn.
Kelly Park
Elk Heart Park G.S.
Spring Park G.S.
Fremont G.S.
Halfmoon Mtn.
Alexander
Alexander Ridge
Warren Bridge Store
Bronx
Forty Rod Flat
Fish Hatchery
Cora
Pinedale
Daniel
Grindstone Butte
Beaver
Hay Ridge
Aspen
Jenkin
Binning
Bayer
Duck Cr.
Prospect Cr.
Soap
Lozier R.
Willow Cr.
New Fork R.
Green R.
Rock Cr.
Twin Cr.
Whiskey Cr.
Eagle Cr.
Kendall
Hill Bros.
Lower Boulder Basin
Upper Boulder Basin
Jim Cr. G.S.
Shirley Basin
Twin Lakes
Watering Lakes
Wells
Native L.
Bear L.
Bear Lodge
Natural
Clear L.
Fuller L.
Downs P.
Slide L.
Elbow L.
Beach L.
White Rock Cr.
Granite Cr.
Scott L.
Stonehammer L.
Glover Pk.
Peak L.
No Name Lakes
Doubletop Mt.
Rainbow L.
Lost Cr.
Gottfried L.
Neth L.
Trail L.
Bridger L.
Section Corner L.
Trapper L.
Black Mt.
Chimpse L.
Bridger Cr.
Miller L.
Lonely L.
Miller Park
Elk Heart Park G.S.
Spring Park G.S.
Surveyor Park A.S.
Fortification Mtn.
Kelly Park
Suds Lake
Halls L.
Half Moon Lake
L. Half Moon
Halfmoon Mtn.
Meadow L.
Fremont G.S.
Fremont Lake
Ridge
Pine Cr.
Pinedale
Daniel
Grindstone Butte
Soap
Bayer
Duck Cr.
Prospect Cr.
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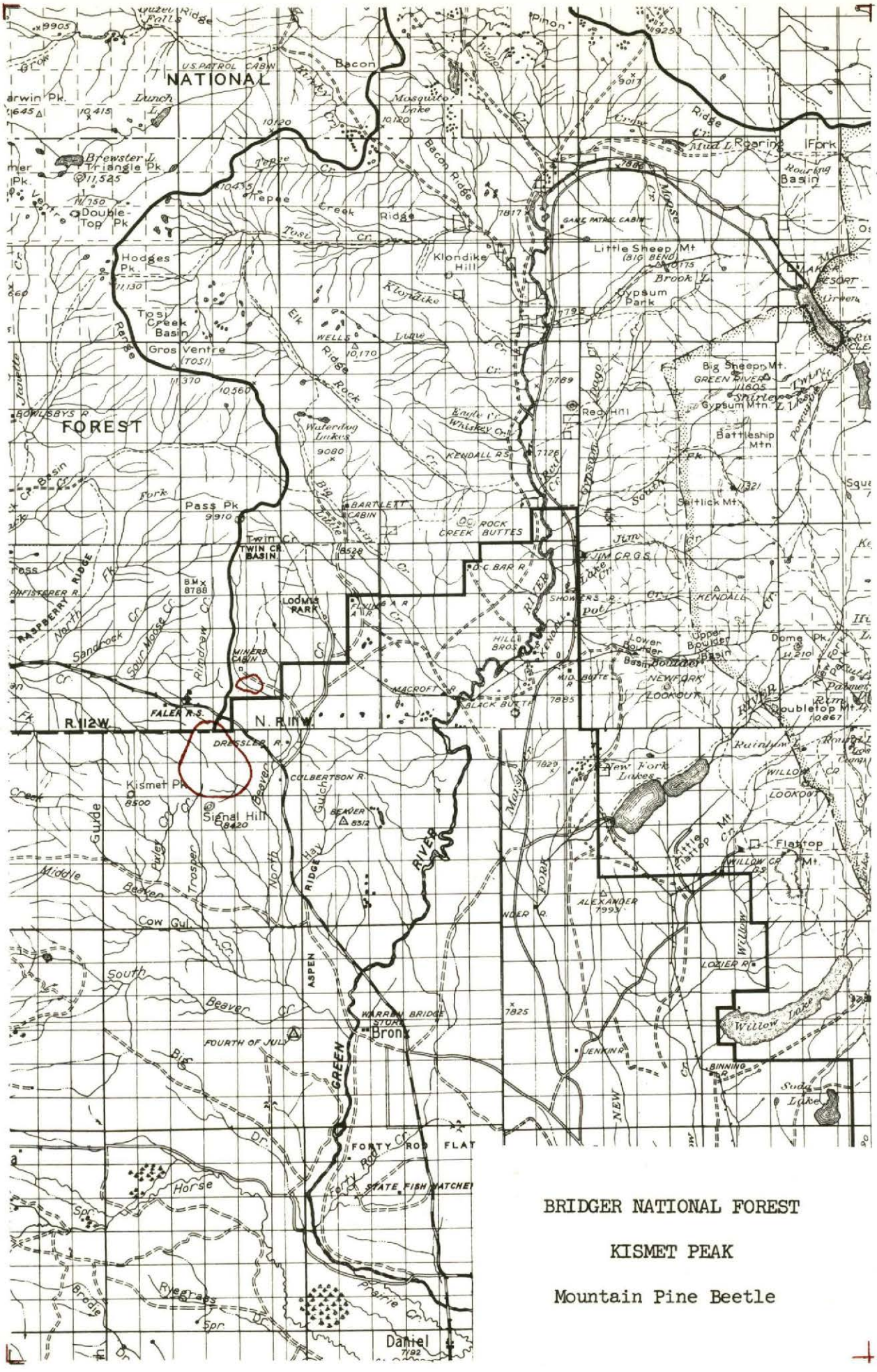
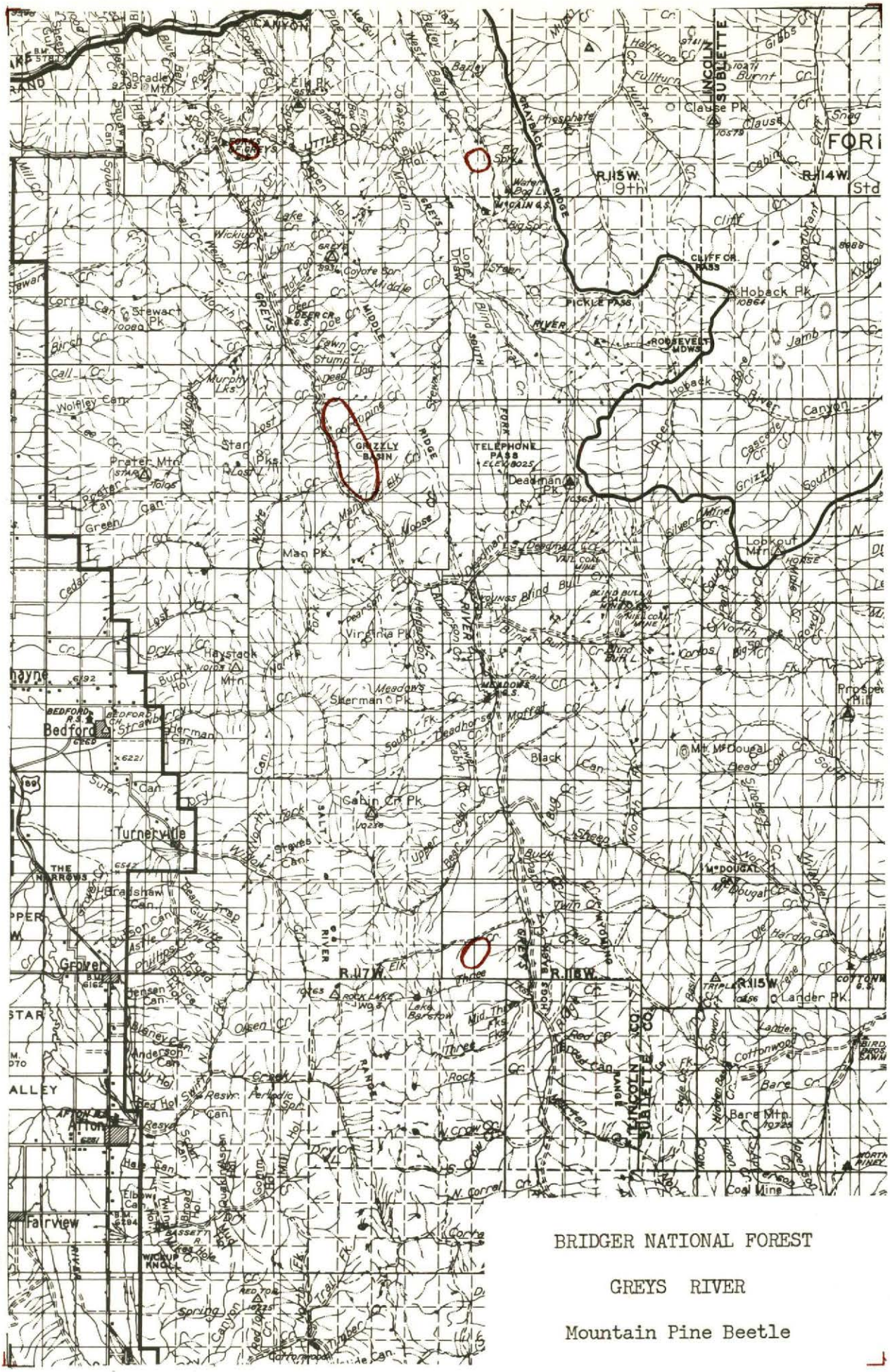


BRIDGER NATIONAL FOREST

KISMET PEAK

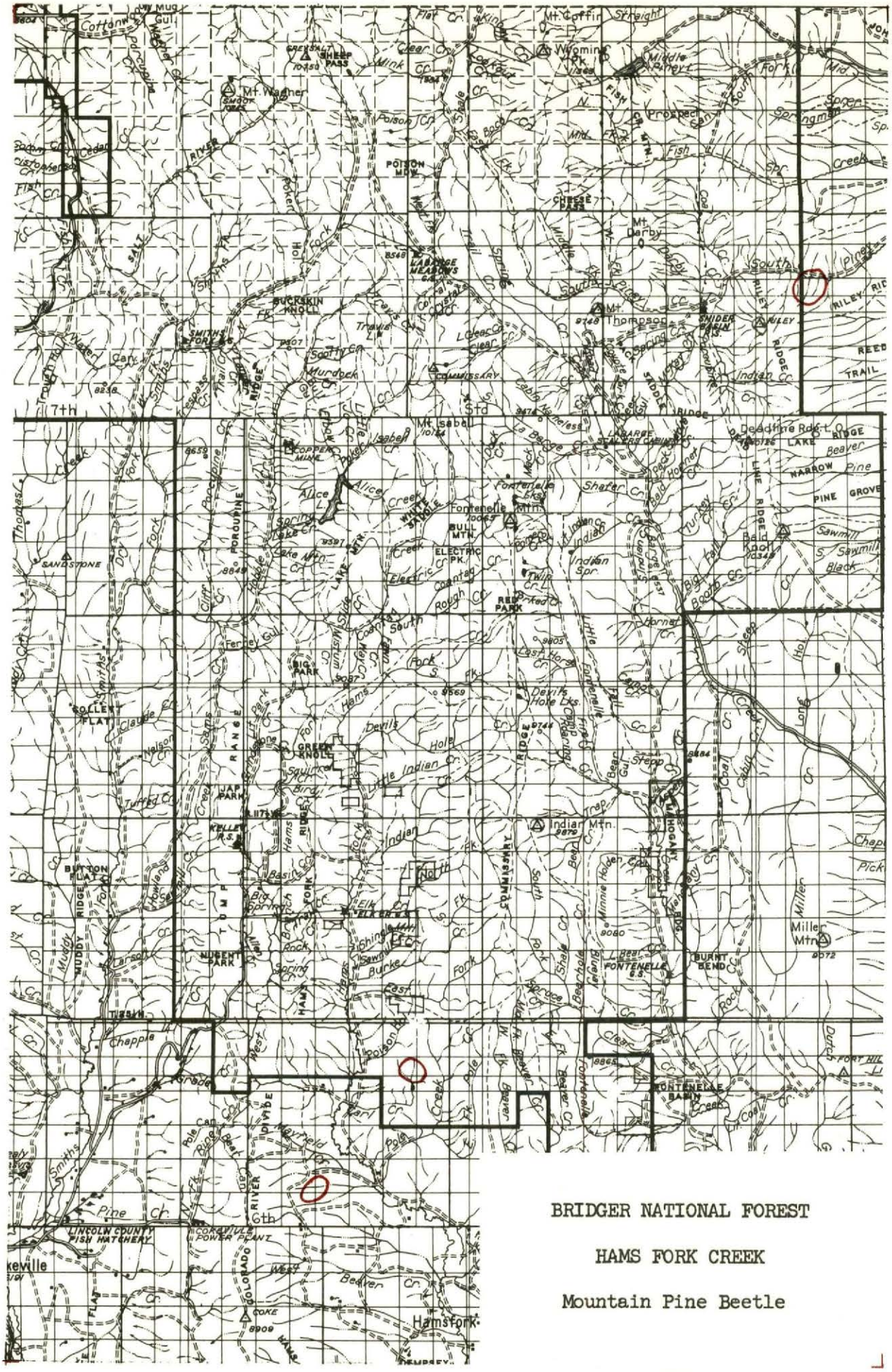
Mountain Pine Beetle



BRIDGER NATIONAL FOREST

GREYS RIVER

Mountain Pine Beetle



BRIDGER NATIONAL FOREST

HAMS FORK CREEK

Mountain Pine Beetle

Cache National Forest

Mountain pine beetle activity in lodgepole pine continues to increase on the Cache National Forest. The majority of the infestations have been present for two or three years. No control measures have been possible on any of these areas except Stauffer Creek, where limited control was undertaken in 1961. Fall biological evaluations were made of infestations located in Trail Hollow, Emigration Canyon, Copenhagen Canyon, Skinner Creek, Dry Canyon-Temple Canyon area, and in Eight-Mile Canyon.

The most serious infestation occurs in the Dry Canyon-Temple Canyon area, southwest of Meadowville, Utah. This infestation was first observed in 1959 and has increased steadily through the years until at present it contains approximately 6,000 infested trees on 4,000 acres. Fall brood densities averaged 200 per square foot of bark area, and the infested trees averaged 16.8 inches d.b.h. Unless some control is undertaken, this infestation will very likely continue at the present epidemic level.

The infestation in the main Eight-Mile Creek drainage about twelve miles south of Soda Springs, Idaho, has existed for the last five or six years but has not shown any particularly aggressive epidemic tendencies. There are presently between 400 and 500 infested trees, a slight increase over last year. The trees occur in small widely scattered groups. Fall evaluations in Eight-Mile Canyon show a relatively low average brood density. Comparing past biological evaluations with the present one, it appears that while the beetles have been holding their own, killing a small amount of timber each year, there has been no material increase from year to year.

Infestation centers also exist in Mill Hollow and South Wilson Creek, side drainages of Eight-Mile Creek. Aerial survey personnel estimated 350 to 400 trees killed last year. This is almost a twofold increase in the number of trees killed over the previous year. In these two side drainages of Eight-Mile Creek it is estimated there are now between 1,000 and 1,200 infested trees. These areas have not been evaluated but a spring evaluation is planned.

The mountain pine beetle infestations in the area west of Georgetown, Idaho, in Beaver, Stauffer, Co-op, and Skinner Creeks, are still quite active. Aerial surveys show considerably more faded trees in these drainages than were present last year. These infestations have been in existence since 1961, and unless unusual mortality occurs, they are likely to show increases again next year. There are about 700 trees currently infested in these drainages. Fall evaluations were made in only one of these areas, Skinner Creek, where brood densities averaged 164 per square foot of bark. The ratio of new attacks to trees killed last year was two to one.

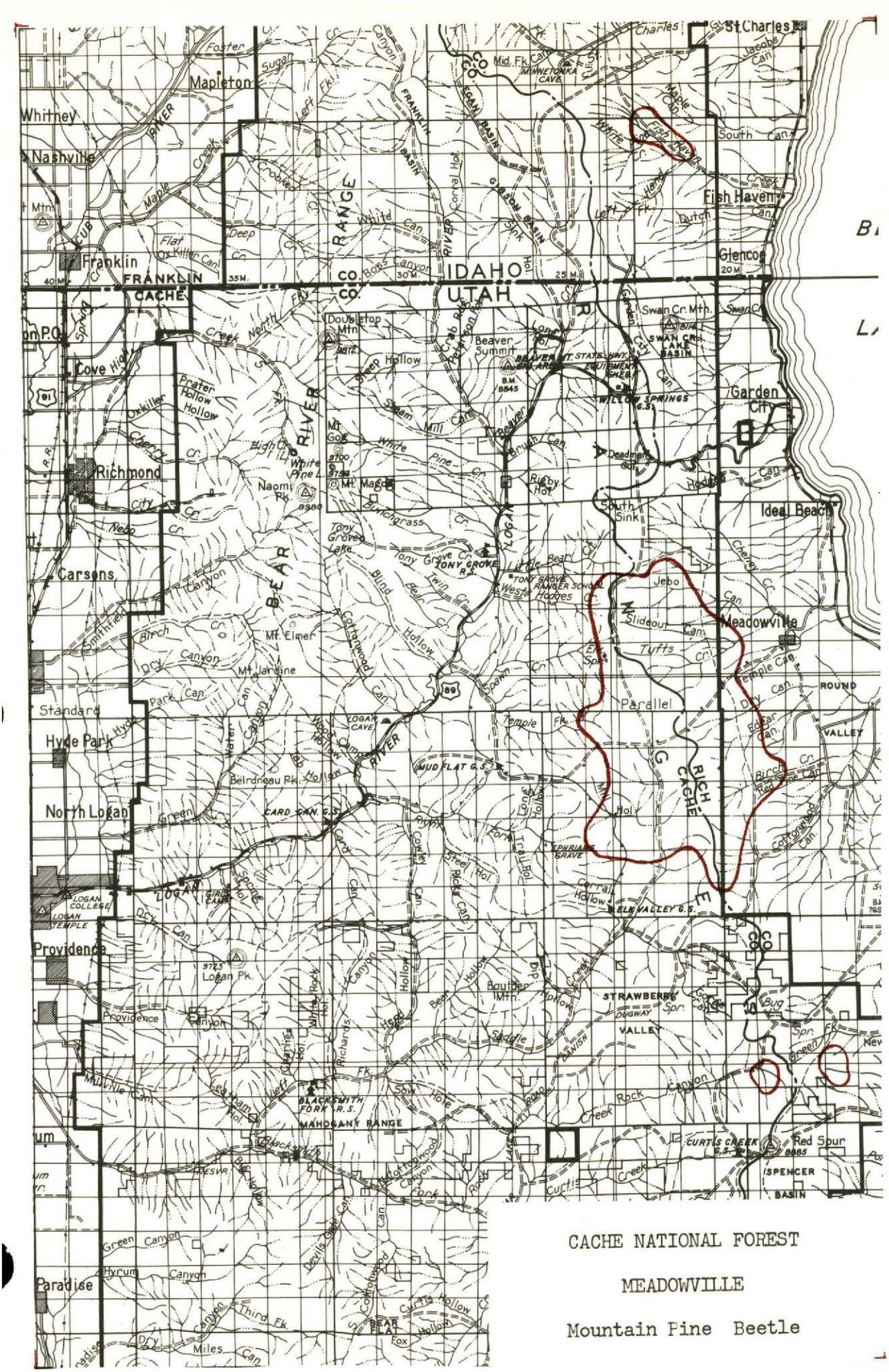
In Copenhagen Canyon, west of Liberty, Idaho, mountain pine beetle activity appears to be relatively static; the new attack to red top ratio being one to one. Brood densities are slightly below the level normally considered epidemic, but there are between 300 and 400 trees currently infested. This bark beetle population, concentrated as it is, could increase with little warning and result in an increased drain of timber unless control measures are undertaken.

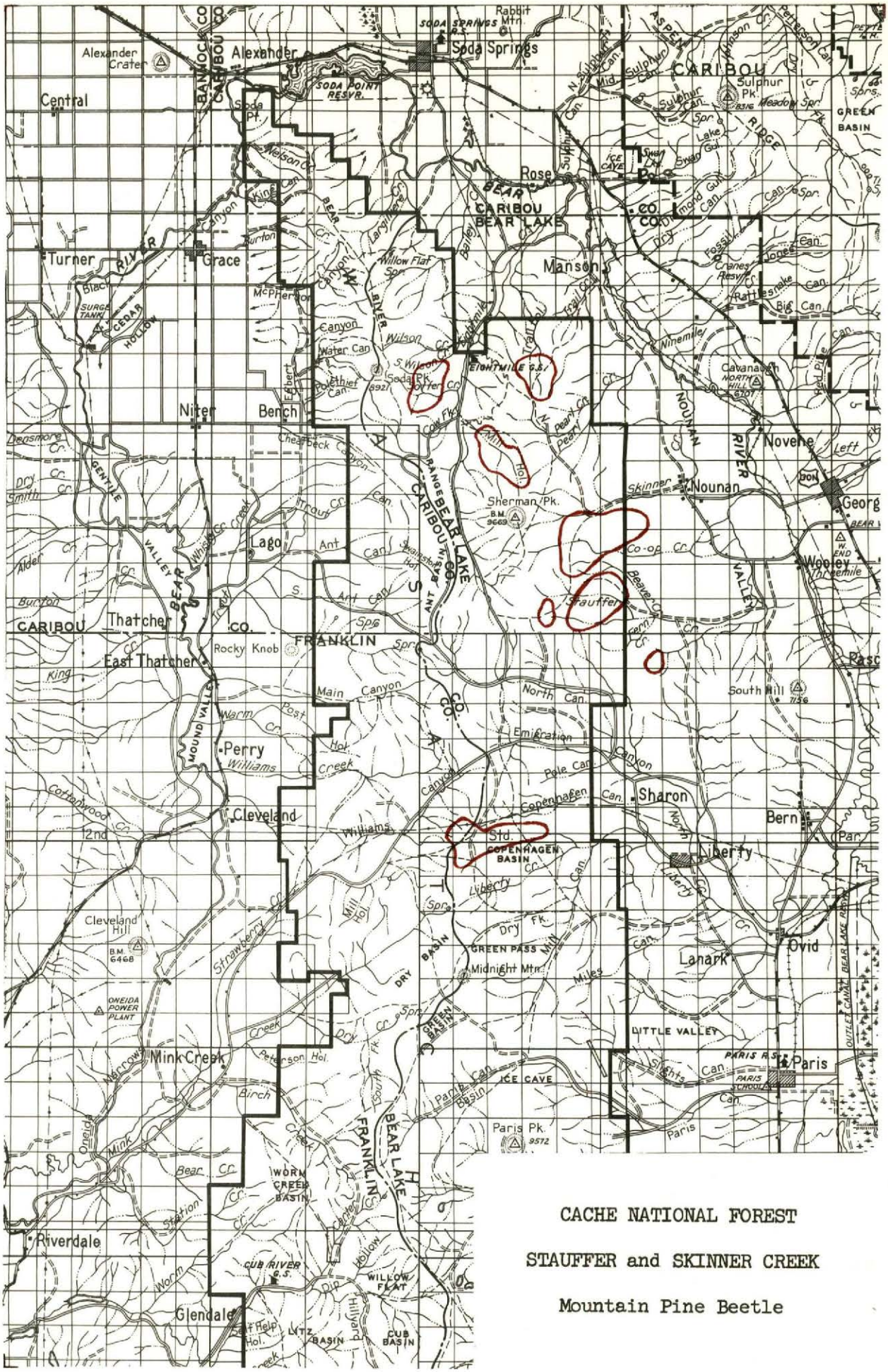
An increase of mountain pine beetle activity on the Emigration Canyon side of the ridge, west of the Copenhagen Canyon infestation, has been noticeable since 1961. Evaluations showed brood densities and gallery starts of 160 and 9.2, respectively, per square foot of bark sample. Average d.b.h. of infested trees sampled was 14.8 inches. This infestation presents a definite threat to the remaining stand, having increased both in area and number of infested trees since last year. If control measures are not undertaken, this infestation could combine with the Copenhagen Canyon infestation and spread throughout the lodgepole type in and around Emigration Canyon.

In Trail Hollow, east of the Eight-Mile Guard Station, aerial detection shows 300 to 400 lodgepole pine faders, an increase ratio of about two to one over last year. Fall brood densities averaged 238 per square foot of bark area, and the ratio of new attacks to red tops was two one. This increasing trend will likely continue unless mortality is heavier than normal before next July or unless control is undertaken.

Other areas containing small infestations of mountain pine beetle recorded by aerial survey personnel occur in Hand Creek, Spencer Basin, Old Canyon, Rock Canyon, New Canyon, and North Canyon. None of these infestations have been ground checked.

In summary, many of the mountain pine beetle infestations on the Cache National Forest are epidemic and show increasing trends. The most serious infestations are in Temple Canyon, Mill Hollow, Copenhagen Canyon, Emigration Canyon, Skinner-Co-op Creek, and Trail Hollow. In these areas, increased losses are expected to occur next year.


CACHE NATIONAL FOREST
MEADOWVILLE
Mountain Pine Beetle



CACHE NATIONAL FOREST

STAUFFER and SKINNER CREEK

Mountain Pine Beetle

Caribou National Forest

Mountain pine beetle populations have shown a steady increase on the Caribou National Forest since 1960. Aerial observers this fall located several new centers of mountain pine beetle activity.

The largest number of infested trees is in the Crow Creek drainage east of Georgetown, Idaho. An estimated 1,500 to 2,000 lodgepole pine on 400 to 500 acres are currently infested with mountain pine beetle. Buildup ratios show three new attacks for each "red top." Fall brood density is high and broods appear healthy. Broods averaged 267.6 per square foot of bark surface. Average d.b.h. of infested trees was 16 inches. Further losses can be expected in this area if the infested overmature trees are not harvested or chemically treated.

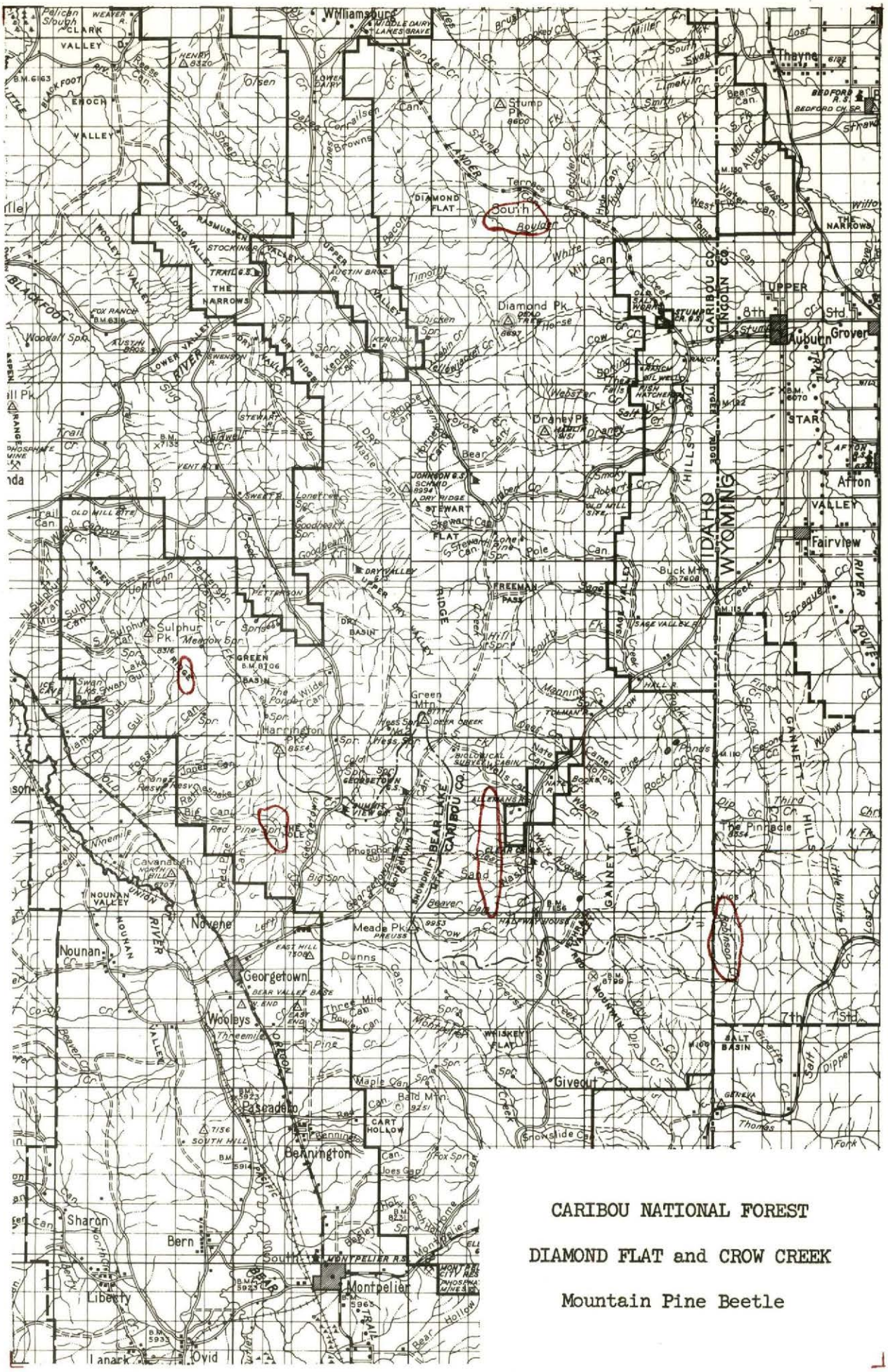
Biological evaluations of the infestation in Diamond Flat, northwest of Auburn, Wyoming, show 1,000 to 1,500 trees currently infested on 600 to 800 acres. Brood densities are not considered high, averaging 160.0 per square foot. Buildup ratio is about one to one or one to two. This infestation is classed as epidemic and more or less static.

There are approximately 200 to 250 infested lodgepole pine trees in the Big Canyon-Red Pine Springs area north of Georgetown, Idaho. Evaluations show brood densities averaging 300 per square foot. The buildup ratio averaged two newly attacked trees for every "red top." The trend is increasing and expected to continue that way at least through next year.

In summary, entomological appraisals in most infested centers showed an increasing trend. In all areas examined buildup ratios were one to one or more, and in most cases, a ratio greater than one to one was the rule. Mountain pine beetle activity is expected to continue at an epidemic level with an increasing trend for at least one more year on the Caribou National Forest.

An isolated mountain pine beetle outbreak on Bureau of Land Management, State, and private lands southeast of Idaho Falls, Idaho was discovered by aerial observers this year, the first that aerial surveys were scheduled in this area. The infestation is scattered throughout T. 1 and 2 S., R. 39 E. It is estimated 10,000 to 15,000 trees were killed last year, and about the same number are presently infested. The infestation is still epidemic and a buildup in number of infested trees is expected to occur again next year unless brood mortality is greater than usual before next spring. The average size of the infested trees is 13 inches d.b.h. The evaluation was made while the brood was in the egg stage. The recorded egg density was 162 per square foot of bark sample. However, egg laying was not complete and it appeared likely brood density would exceed 200 per square foot.

Unless control action is undertaken, it is expected this stand of lodgepole will be seriously depleted.



CARIBOU NATIONAL FOREST

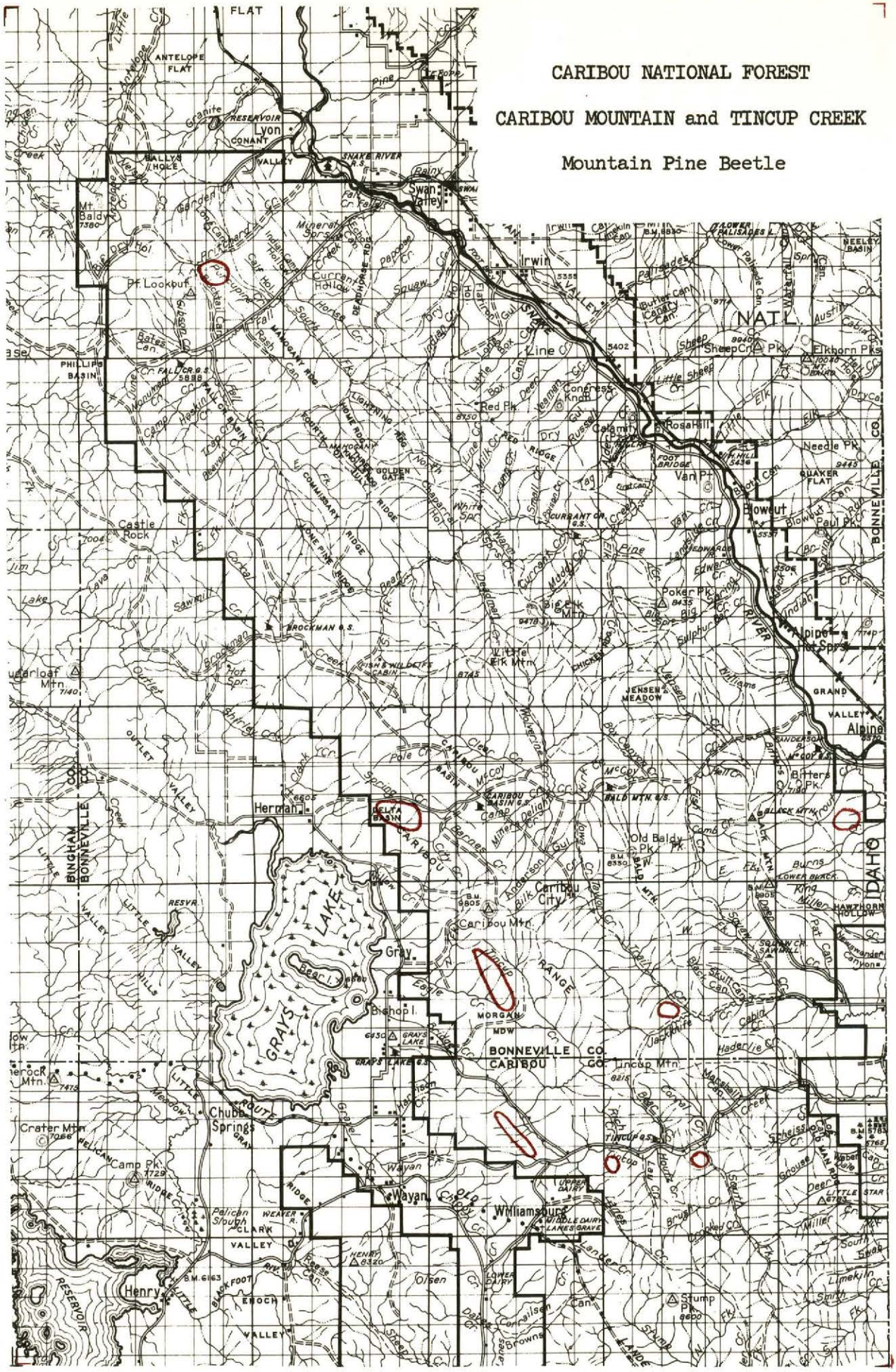
DIAMOND FLAT and CROW CREEK

Mountain Pine Beetle

CARIBOU NATIONAL FOREST

CARIBOU MOUNTAIN and TINCUP CREEK

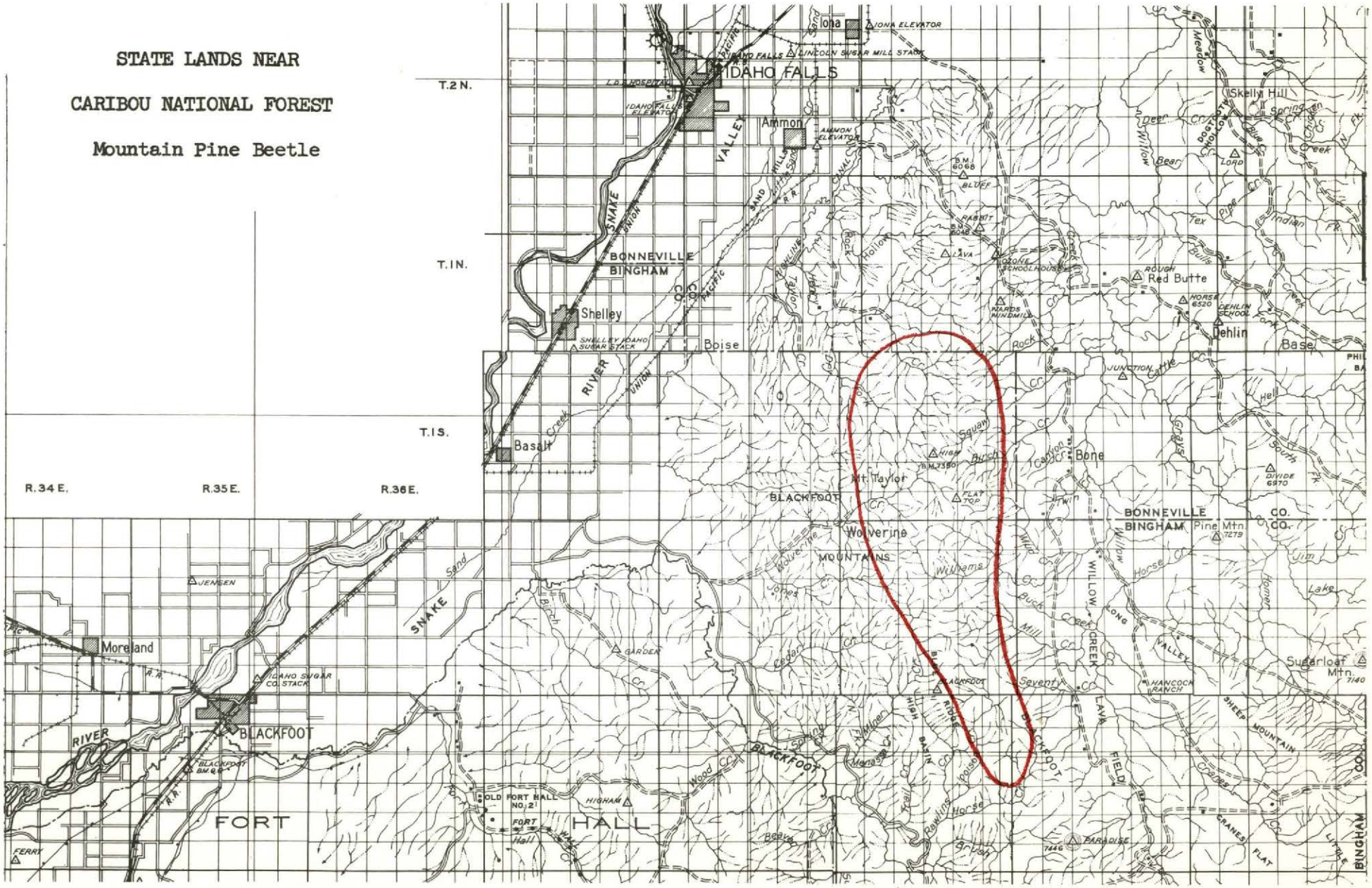
Mountain Pine Beetle



STATE LANDS NEAR

CARIBOU NATIONAL FOREST

Mountain Pine Beetle

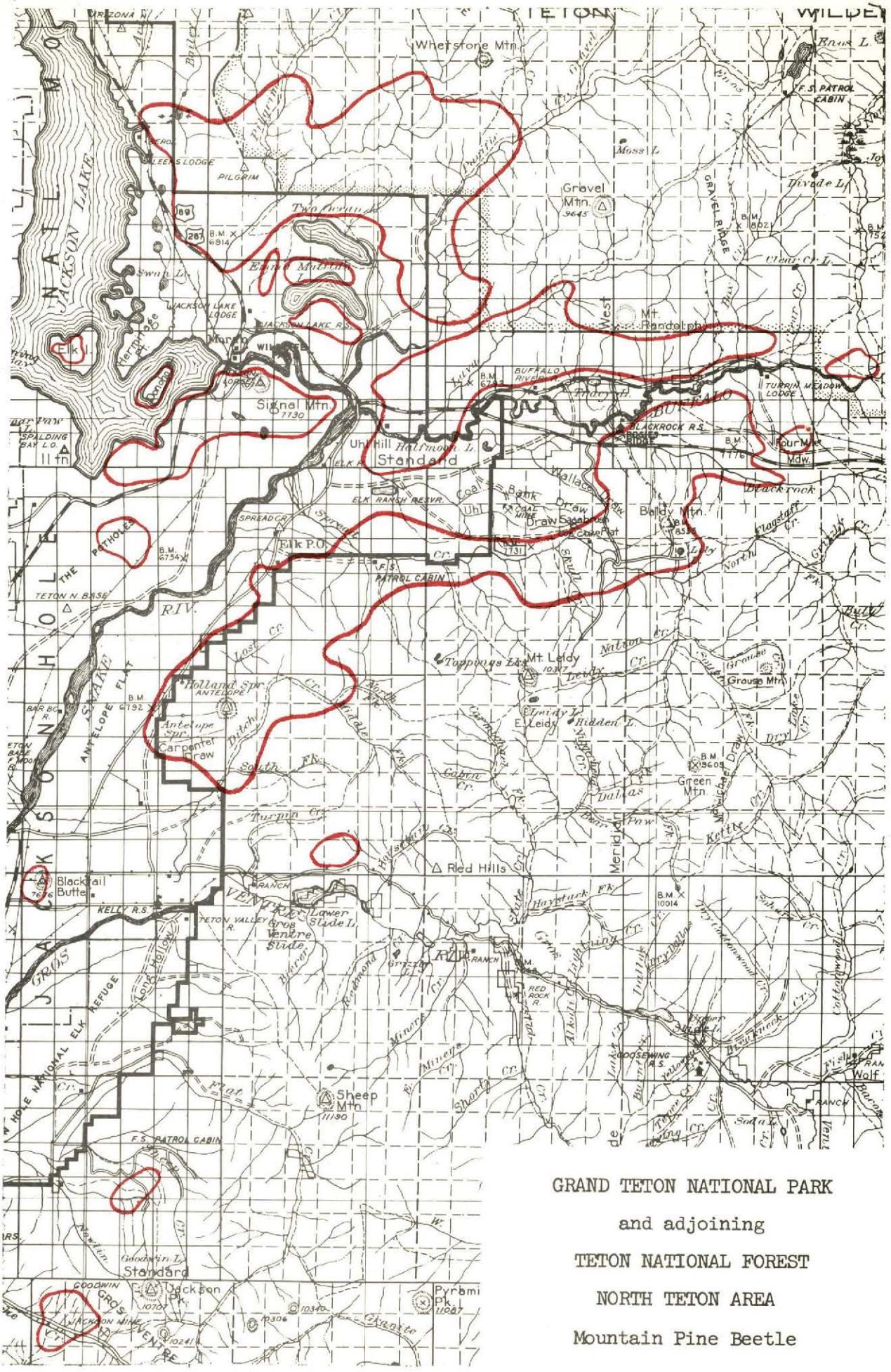


Grand Teton National Park

Mountain pine beetle populations have shown a steady increase in Grand Teton National Park and adjacent forest lands since 1955. Control efforts were restricted in 1962 due to lack of funds. In that year, spring brood densities were high, averaging 73 per square foot of infested bark. As a result, a substantial increase in the number of infested trees occurred. The 1962 fall operational survey showed over 44,000 lodgepole pine infested with mountain pine beetle. Only 2,000 trees were chemically treated. Untreated trees contained average fall brood densities of over 300 per square foot, which by spring 1963 were reduced to an average of 43.6 per square foot of bark sample. Brood mortality through the winter ranged from 76.9 to over 98 percent. Only in localized areas along the northern end of Grand Teton National Park did the mortality exceed 98 percent. This mortality, however, was not sufficiently widespread or severe enough to change the epidemic trend. Population densities have been so large in the Grand Teton National Park the last few years that winter mortality averaging nearly 90 percent has not affected the increasing trend of the epidemic.

Approximately 30,000 infested trees were treated this year. Nearly 15,000 infested trees were left untreated because of lack of funds, and fall operational surveys show approximately 60,000 trees are currently infested with mountain pine beetle, a buildup ratio of four to one.

Biological evaluations this fall show epidemic conditions are still present in all areas sampled. Brood densities average 269.7 per square foot of infested bark. Brood densities on the north end of the park were considerably higher than in the infestation in the southern portion of the park. The number of attacks per square foot increased over last year from 7.9 to 9.1. At present, there are no biological data to indicate the epidemic will start downward in the future, in fact, the buildup ratio next year is likely to be as great as it was this year. Obviously, from the entomological viewpoint, continuation of the chemical control program in Grand Teton National Park is warranted.



GRAND TETON NATIONAL PARK

and adjoining

TETON NATIONAL FOREST

NORTH TETON AREA

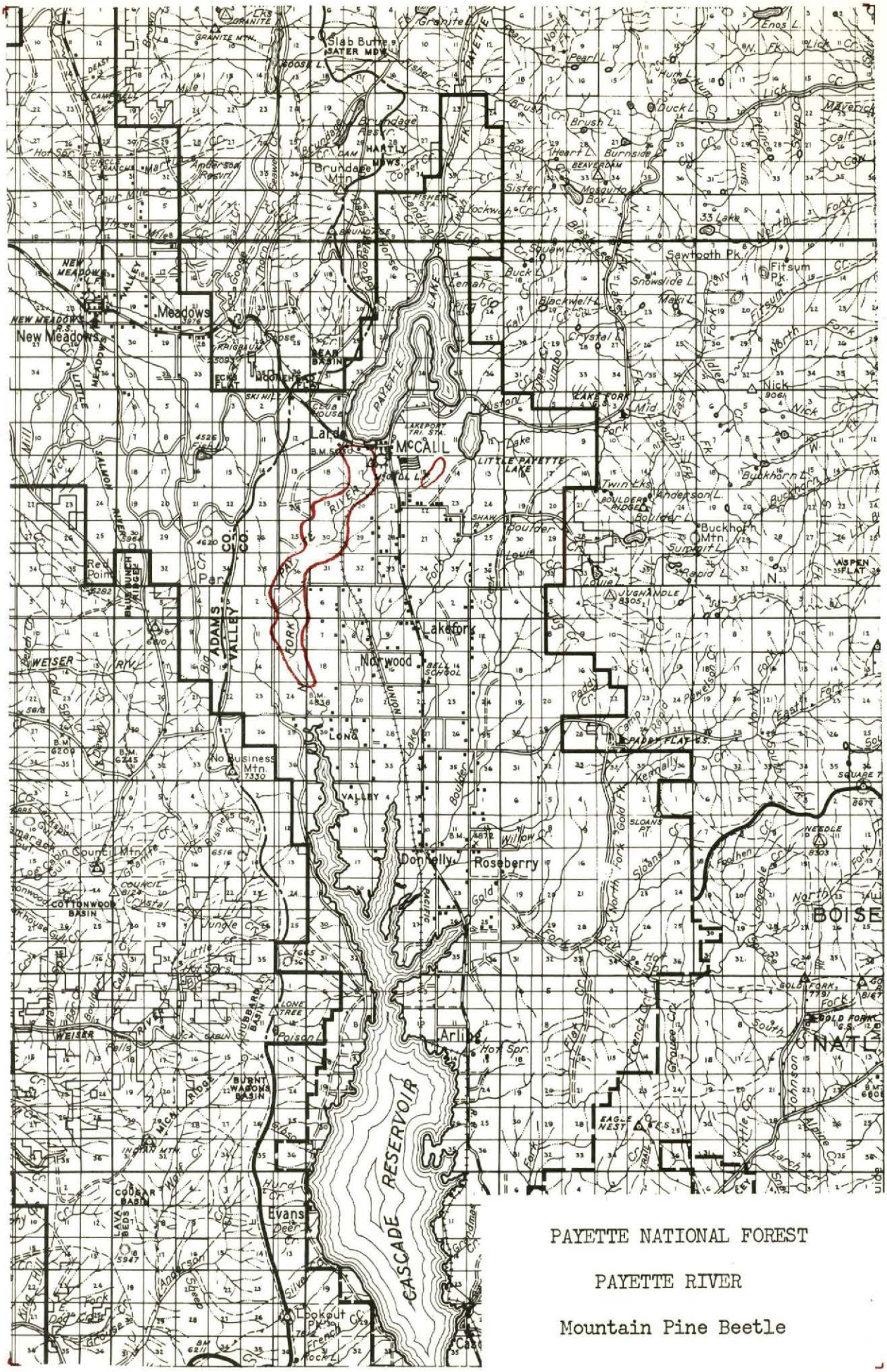
Mountain Pine Beetle

Payette National Forest

In 1961 an aggressive infestation of mountain pine beetle in lodgepole pine was detected along the Payette River south of McCall, Idaho. The infestation contained approximately 18,000 attacked trees and extended from McCall southward for seven miles toward Cascade Reservoir. Most of the affected area was on stands of State and private ownership.

An aggressive suppression program was undertaken in the winter of 1962-63 by State personnel. From December 3, 1962, to June 6, 1963, infested trees were either burned standing, or felled and burned. A total of 13,934 trees were treated.

Biological evaluations in the fall of 1963 showed that broods were considerably lighter than those sampled the fall of 1962. Fall surveys show that about 2,000 lodgepole pine are infested in scattered groups throughout the Payette River bottom. From the biological standpoint, it would be desirable to continue suppression action in this infestation at least one more year.



PAYETTE NATIONAL FOREST

PAYETTE RIVER

Mountain Pine Beetle

Sawtooth National Forest

On the Sawtooth National Forest, the mountain pine beetle has been active for many years along Warm Spring Creek and its side drainages. Last year, the infestation showed fewer than 2,500 infested trees, and in general, the bark beetle population trend was downward.

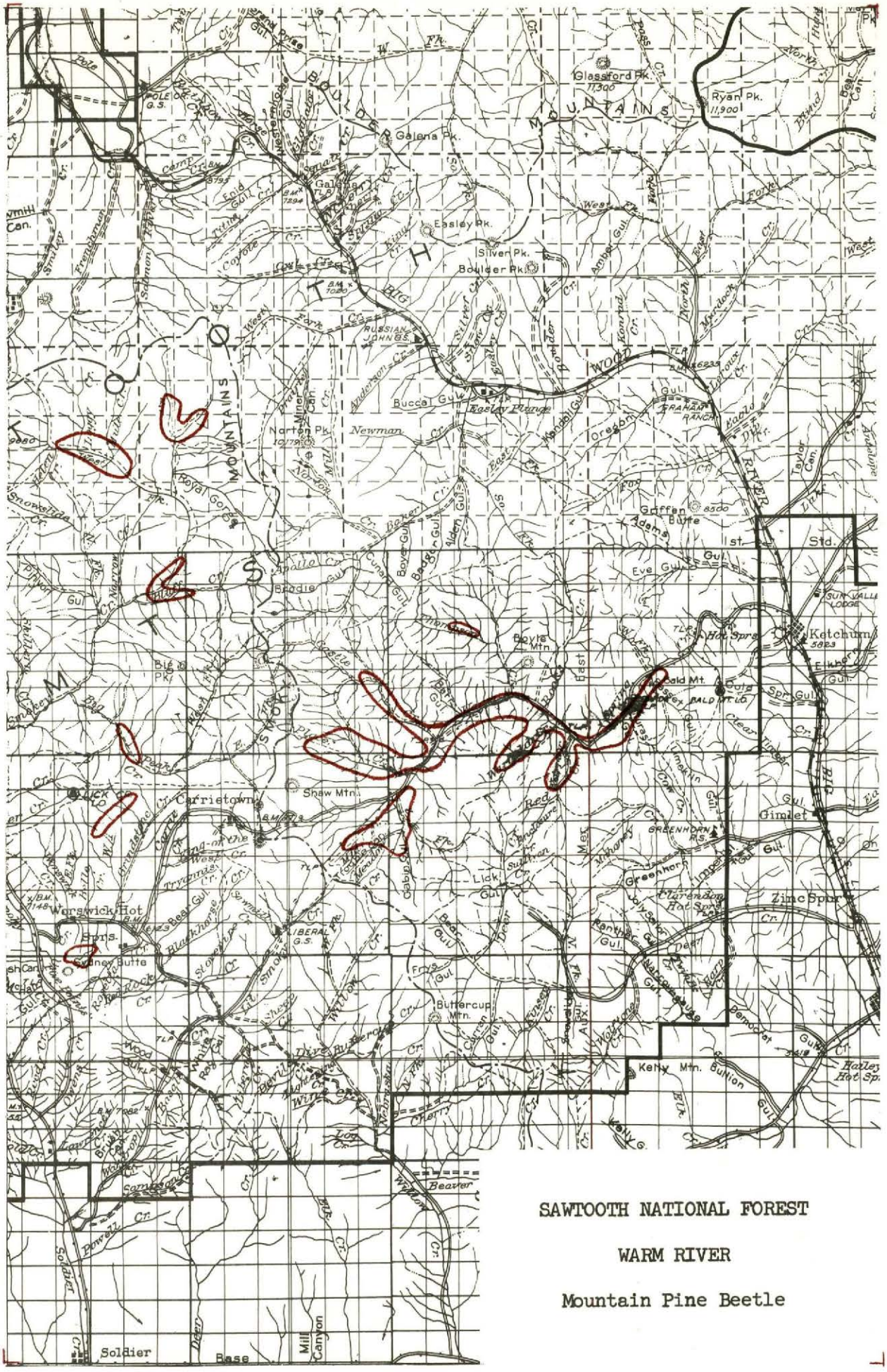
To date, only that portion of the Sawtooth National Forest within the spruce budworm infestation boundaries has been covered by aerial survey but ferrying provided a general look at the infestation in the Warm Springs Creek area. About 15 road miles east of Ketchum, Idaho, in Placer Creek and Castle Creek, there appeared to be an increase in the number of faders over last year. There were apparently fewer faders than last year in the remainder of the Warm Spring Creek drainage.

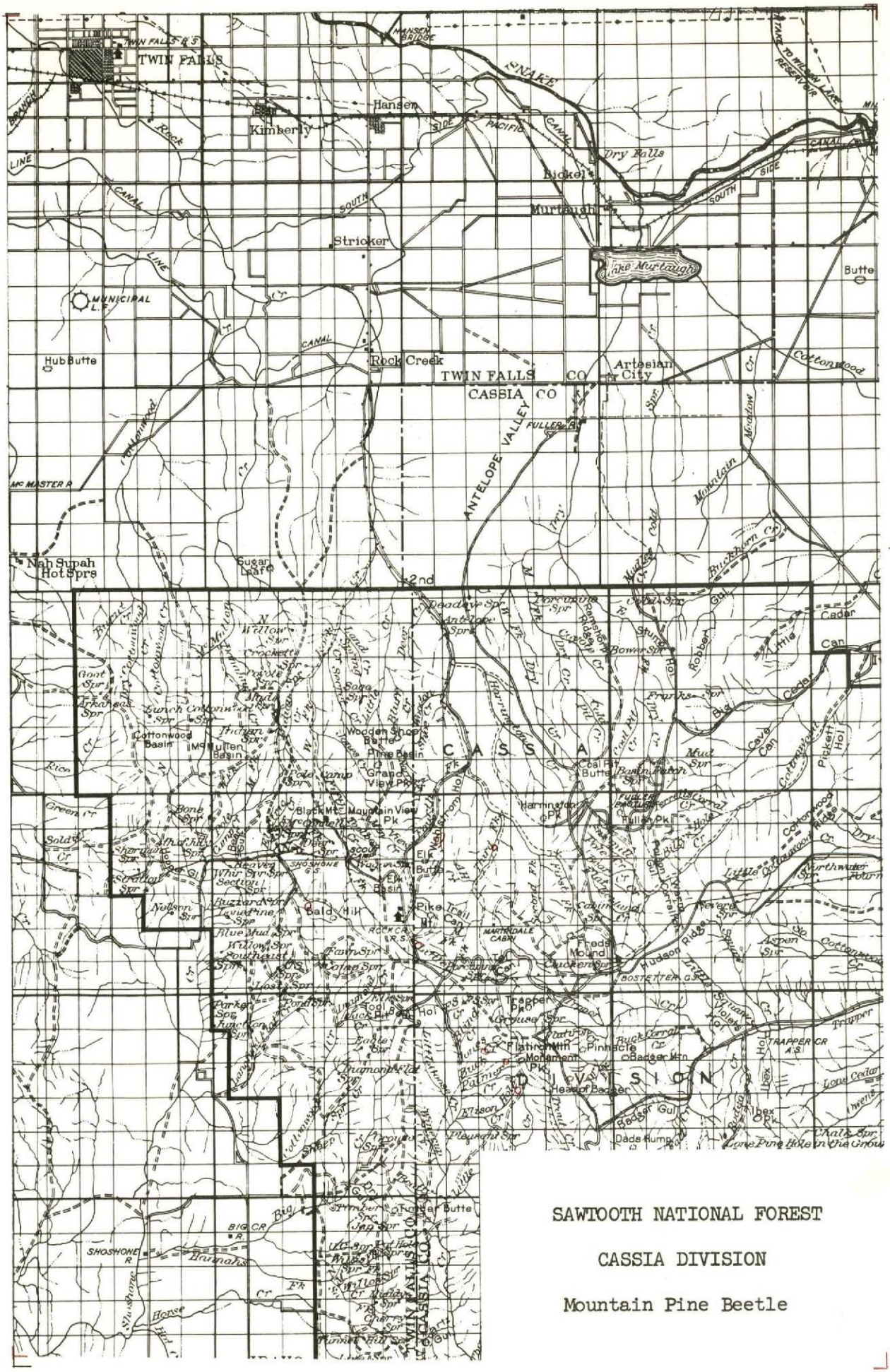
The four isolated hotspots of mountain pine beetle activity reported last year at the head of Big Smokey Creek, were not covered by aerial survey this year, neither was the small infestation north of Warswick Hot Springs. It was not possible to evaluate any of the mountain pine beetle infestations on the ground this year.

On the Cassia Division in the vicinity of Bostetter and Rock Creek Guard Stations there are eight small infestations of mountain pine beetle. The aerial survey observer recorded an increase in the number of faded trees over those detected last year.

A timber sale for 1,200 infested trees was made in Wahlstrom Hollow and most of these trees were logged before beetle flight. An additional 300 infested trees are scheduled to be logged before next July from another of the infested centers. However, there will be about 3,000 infested trees remaining in areas that cannot be logged in the immediate future.

A late fall evaluation of these infestations showed brood densities higher than necessary to continue the epidemic trend. A dipterous predator, Medetera sp., was relatively abundant in most of the infested trees, but is not expected to cause a significant population reduction. Woodpeckers were active in the infested areas but it is not possible to say how effective they will be in reducing the bark beetle population. In all likelihood, an increased number of trees will be infested next year unless suppressive measures are undertaken or natural factors cause more than the expected amount of brood mortality.


SAWTOOTH NATIONAL FOREST
WARM RIVER
Mountain Pine Beetle



SAWTOOTH NATIONAL FOREST

CASSIA DIVISION

Mountain Pine Beetle

Nov 1963

Targhee National Forest

Mountain pine beetle infestations in lodgepole pine on the Targhee National Forest continue at epidemic levels. In spite of an aggressive logging program and the chemical treatment of 31,511 trees in 1963, National Forest survey crews estimate 74,672 trees are currently infested on 36,669 acres.

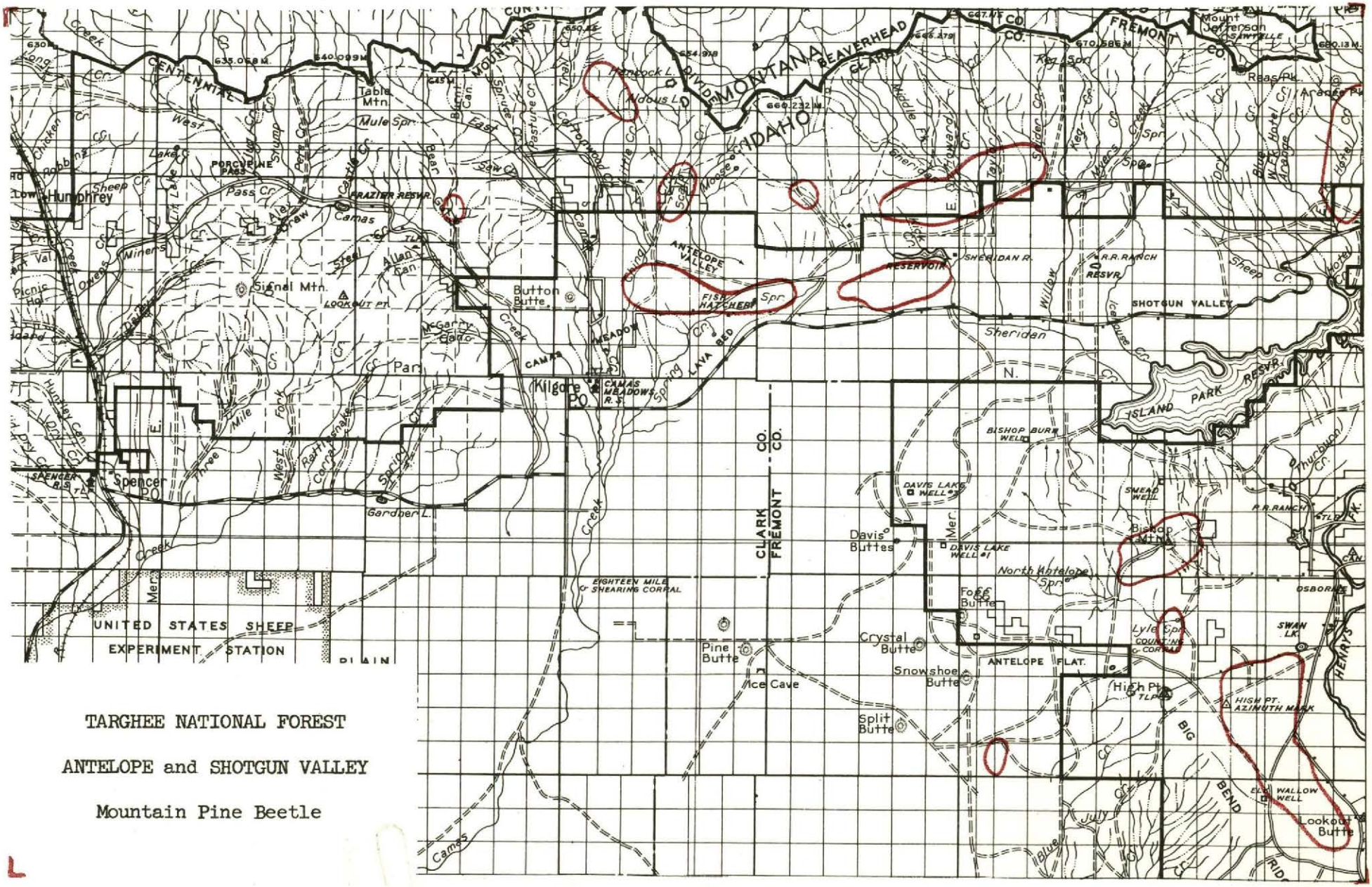
The largest infestation is west of Highway 191 and south of Island Park Reservoir in the vicinity of Bishop Mountain. Operational surveys this fall estimate 34,366 trees are now infested. Approximately 40 to 50 percent of the lodgepole pine in this stand is over 12 inches d.b.h. Fall brood densities average 239.6 per square foot. The buildup ratio averaged three newly attacked trees for each "red top."

The Teton Basin area, Canyon Creek, Moody Creek, and Hawley Gulch are estimated to have 21,550 infested trees on approximately 5,500 acres. This is an average of four trees per acre. Highest brood densities on the Targhee National Forest were recorded from Badger and Bull Elk Creeks in the Teton Basin. Broods averaged 312 per square foot of bark surface. The buildup ratio was four to one, and the infestation is classed as epidemic with a definite increasing tendency.

Chemical treatment of infested trees and logging of host material has reduced the number of infested trees in Hawley Gulch and Moody Creek, however, in areas not treated evaluations showed relatively high brood counts. Overall indications point toward a continuation of epidemic conditions with the likelihood of an increase next year unless the beetle population is reduced by control work.

Operational surveys this fall showed 4,000 trees currently infested on 1,423 acres on the Kilgore-Island Park Ranger Districts. The buildup ratios averaged three newly attacked trees for every "red top." Over-wintering brood mortality did not significantly reduce the existing populations. Fall brood densities average 242.0 per square foot and the overall picture indicates a definite increasing tendency.

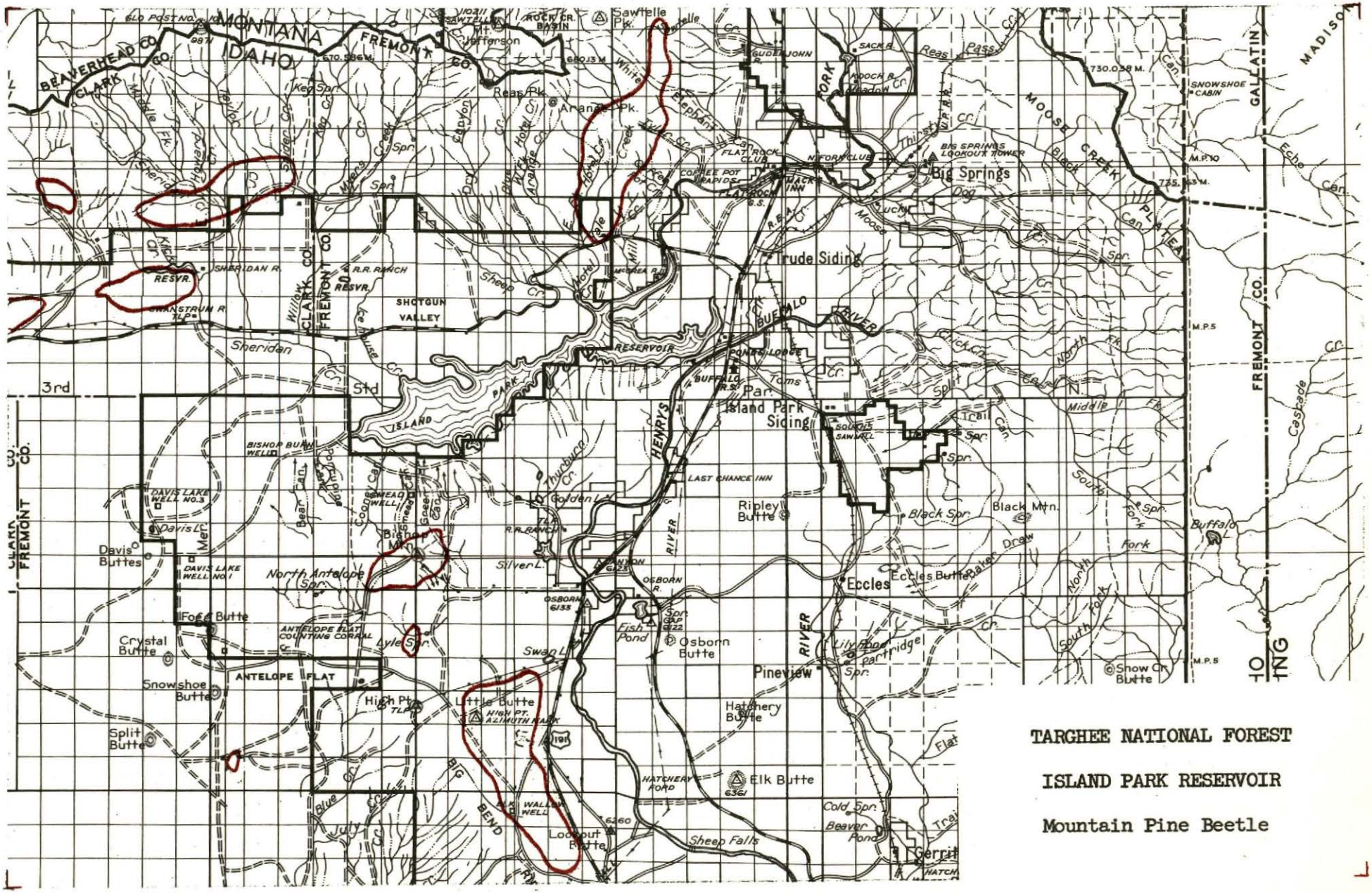
In summary, all areas examined show brood densities indicative of epidemic conditions. The increasing trend is expected to continue. An aggressive control program will be needed to prevent excessive losses and further spread of the infestation.



TARGHEE NATIONAL FOREST

ANTELOPE and SHOTGUN VALLEY

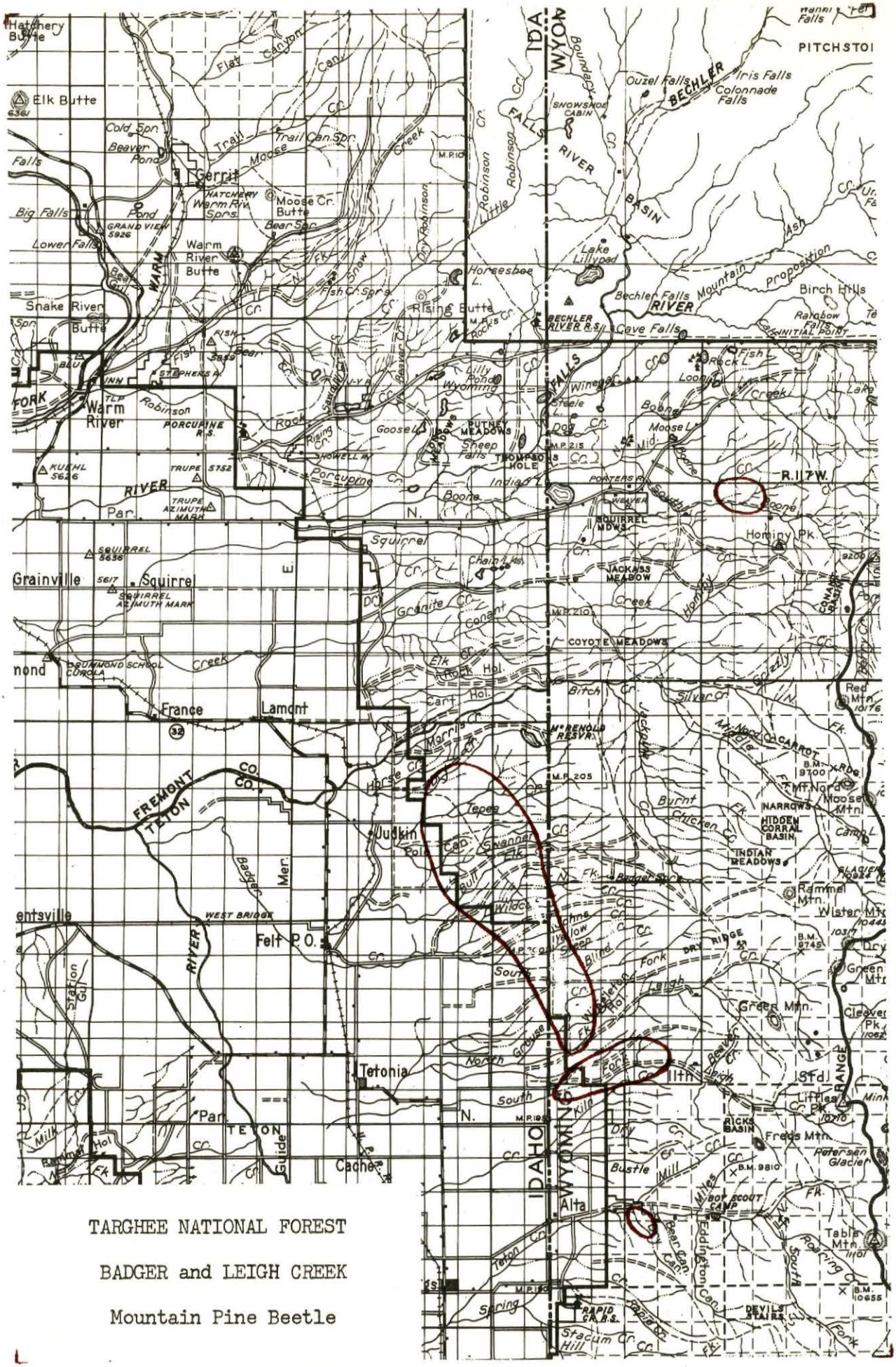
Mountain Pine Beetle



TARGHEE NATIONAL FOREST

ISLAND PARK RESERVOIR

Mountain Pine Beetle


Hatchery Butte
Elk Butte
Gerrit
Warm River Butte
Snake River Butte
Warm River
Grainville
Squirrel
France
Lamont
Judkin
Felt P.O.
Tetonia
Alta
Driggs
Victor
Teton Pass
Jackson
Yellowstone
Grand Teton
Idaho Falls
Rexburg
Ashton
Island Park
Henrys Lake
Targhee Pass
Big Falls
Lower Falls
Falls
Bechler Falls
Iris Falls
Colonnade Falls
Ouzel Falls
Cave Falls
Lake Lillypad
Horseshoe L.
Rising Butte
Sheep Falls
Thompson Hole
Squirrel Mdws.
Jackass Meadow
Coyote Meadows
Indian Mdws.
Putney Meadows
Hominy Pk.
Red Mtn.
Moose Mtn.
Rammel Mtn.
Green Mtn.
Freds Mtn.
Table Mtn.
Devils Stairs
Hidden Corral Basin
Indian Meadows
Ricks Basin
Bechler River
Robinson Creek
Porcupine Creek
Fish Creek
Snake River
Teton River
Badger Creek
Leigh Creek
Bustle Creek
Stacum Hill
Eddington Canyon
Bear Can.
Porcupine R.S.
Bechler River R.S.
Rapid Cr. R.S.
Howell M.
Squirrel Azimuth Mark
Squirrel 5638
Kuehl 5626
Trupe 5752
Trupe Azimuth Mark
Grand View 5926
Drummond School
Corola
Stephens
Fish Sass
Bear
Fish
Rock
Loon
Lake
Wilson
Bonne
Moose L.
Dog
Steele L.
Mid.
Wilde
Blind
Fork
Leigh
Brick
Kilgore
Beaver
Ash
Proposition
Birch Hills
Rainbow Falls
Initial Point
Snowshoe Cabin
Lilly Pond Wyoming
Rock Cr.
Robinson Cr.
Little Robinson
Boundary Creek
Falls River
Basin
Bechler Falls Mountain
Moose Cr. Butte
Bear Spr.
Fish Cr. Spr.
Beaver Pond
Cold Spr.
Trail Can. Spr.
Flat Canyon
Hatchery Warm Riv. Spr.
Big Falls Pond
Lower Falls
Beaver Cr.
Sandy
Rising Cr.
Goose L.
Porcupine Cr.
Squirrel
Granite Cr.
Conant
Elk Cr.
Robert Hol.
Cart. Hol.
Marr Cr.
Horse Cr.
Tepee
Swannack Elk
Badger Mer.
Station Gulch
Milk
Hammond Hol.
Guide
Cache
Par.
Fk.
Cr.
Creek
Canyon
Trail
Meadows
Mer.
Hol.
Par.
Ridge
Basin
Mtn.
Pk.
Lake
Falls
Butte
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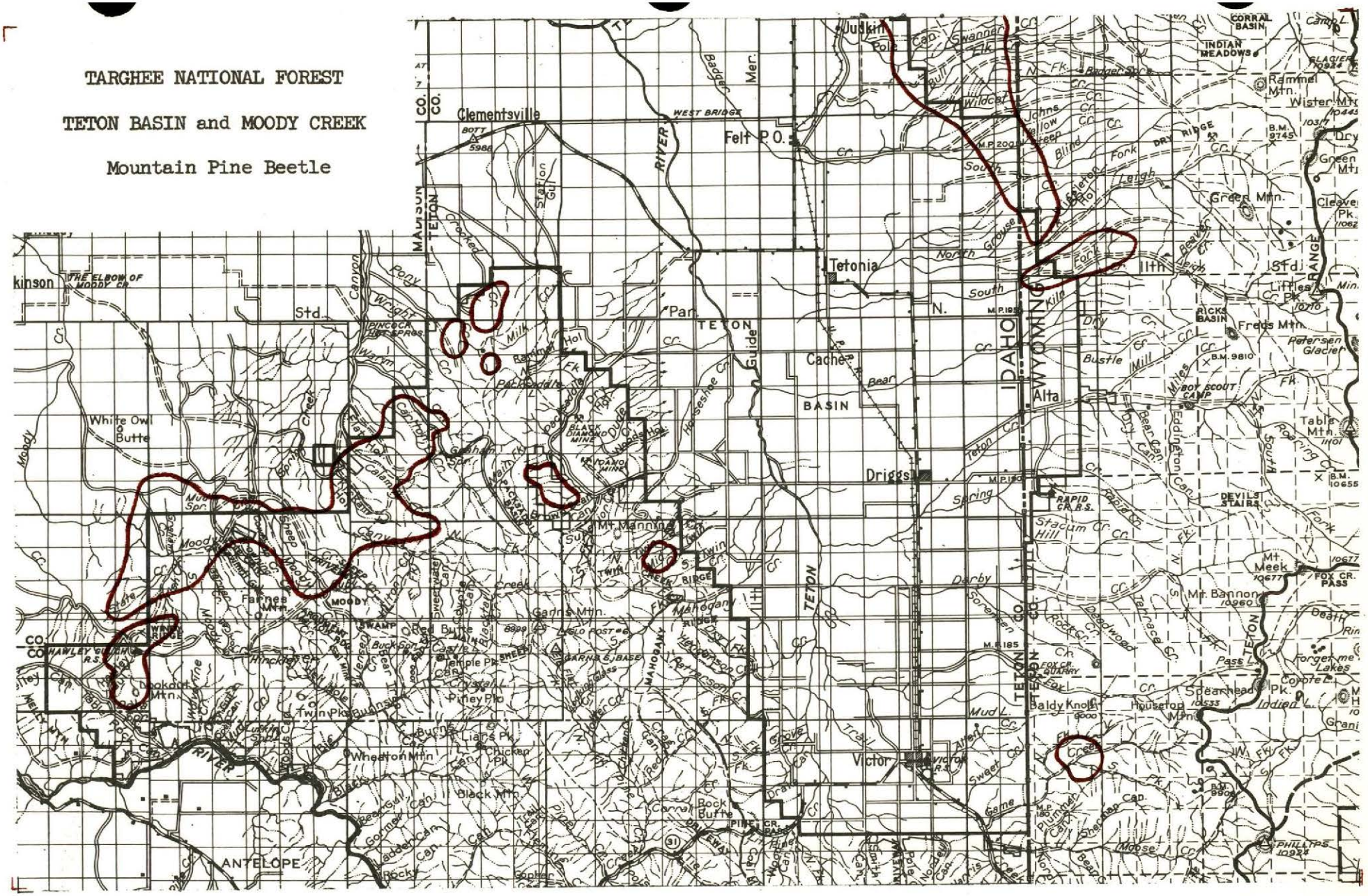
TARGHEE NATIONAL FOREST

TETON BASIN and MOODY CREEK

Mountain Pine Beetle



Teton National Forest

Mountain pine beetle populations have been at epidemic levels on the Teton National Forest since 1956. The number of infested trees has been reduced in some control units by logging and chemical control, while in others the number of infested trees remains about the same or has increased. During 1963, over 90,000 infested trees were chemically treated or harvested and removed. Operational surveys this fall estimate 180,300 trees currently infested. Aerial detection surveys revealed considerable extension of old infestations as well as several new infestation centers. The aerial observer estimates an additional 60,000 to 70,000 faders inside the Teton wilderness boundary which were not included in the operational surveys. Infestations on the Teton National Forest are discussed in two parts - North Teton and South Teton.

North Teton

All of the Teton National Forest north of Jackson, Wyoming is considered as North Teton in this report. Estimates from the operational survey show 158,000 infested trees within the areas surveyed.

Fall 1962 brood densities on the Teton National Forest averaged 198.2 per square foot of infested bark. In July, 1963 brood densities averaged 114.4 per square foot sample, over one-half the brood having survived. Brood mortality exceeded 98 percent in some areas by this spring, however, the surviving brood was still considerably above the level sufficient to maintain the present epidemic trend.

The following table shows biological and operational survey data collected from the North Teton this fall:

	Biological Data			Operational Survey	
Location	Ave. DBH	Ave. Brood Density Per Square Foot	Attacks Per Square Foot	Acres	New Attacks
Cache Creek	15.5	398.4	9.6		
Lost Creek	16.0	403.2	10.4	1,441	18,240
Antelope Mtn.	12.6	382.4	10.8	1,155	9,065
So. Spread Crk.	10.0	208.8	8.4)	3,791	24,300
Spread Creek			10.4)		
Blackrock-Hatchet	14.8	286.4	7.6	4,510	14,584
Pacific Creek	11.6	358.4	11.4	3,523	76,309

Brood densities and attacks per square foot of bark sample for all areas combined now average 314.6 and 9.8, respectively. This is over one-half again as much brood as was present on the North Teton last fall.

Most of the lodgepole pine above six inches d.b.h. have been killed on Antelope Mountain. The number of infested trees in this unit will decrease next year, but control is needed to prevent the beetle population from moving into the extensive stands of lodgepole pine in upper and south Spread Creeks.

A small isolated infestation east of Jackson, Wyoming in Cache Creek contains 150 to 200 lodgepole pine currently infested with mountain pine beetle. Brood densities averaged 398.4 per square foot of bark sample, which is far above the level we believe necessary to maintain the outbreak at its present epidemic level. This infestation is expected to increase in intensity and unless treated, it could easily spread into the adjoining Game Creek drainage.

From the entomological standpoint, the mountain pine beetle situation on the North Teton areas is critical. It is predicted that unless extremely high, (greater than 90 percent) brood mortality occurs throughout the North Teton and Grand Teton National Park, an increased number of trees will be attacked next year. It is likely the buildup ratio will exceed four to one.

Even if it is possible to chemically treat or log 90 percent of the trees now infested, it is quite possible there will be in the neighborhood of 80,000 to 100,000 trees attacked next fall in the North Teton unit.

South Teton

Operational surveys conducted this fall estimated there are about 22,300 newly attacked trees within the area surveyed in the South Teton unit. Not all of the areas containing infested trees were surveyed. There has been an increase in infested area, but a decrease in the number of infested trees in areas where control was conducted the past two years.

In lower Fall Creek the number of infested trees has increased steadily since 1961. In this area approximately 1,680 lodgepole pine trees are infested on about 200 acres. Brood densities average 238.4 per square foot. The trend is increasing and control is needed.

In Dell Creek, infested trees occur in scattered groups. Operational surveys show 7,278 lodgepole pine trees currently infested on 2,409 acres. Brood densities average 280.4 per bark sample. There are no signs of a reversal of the present epidemic within the next year.

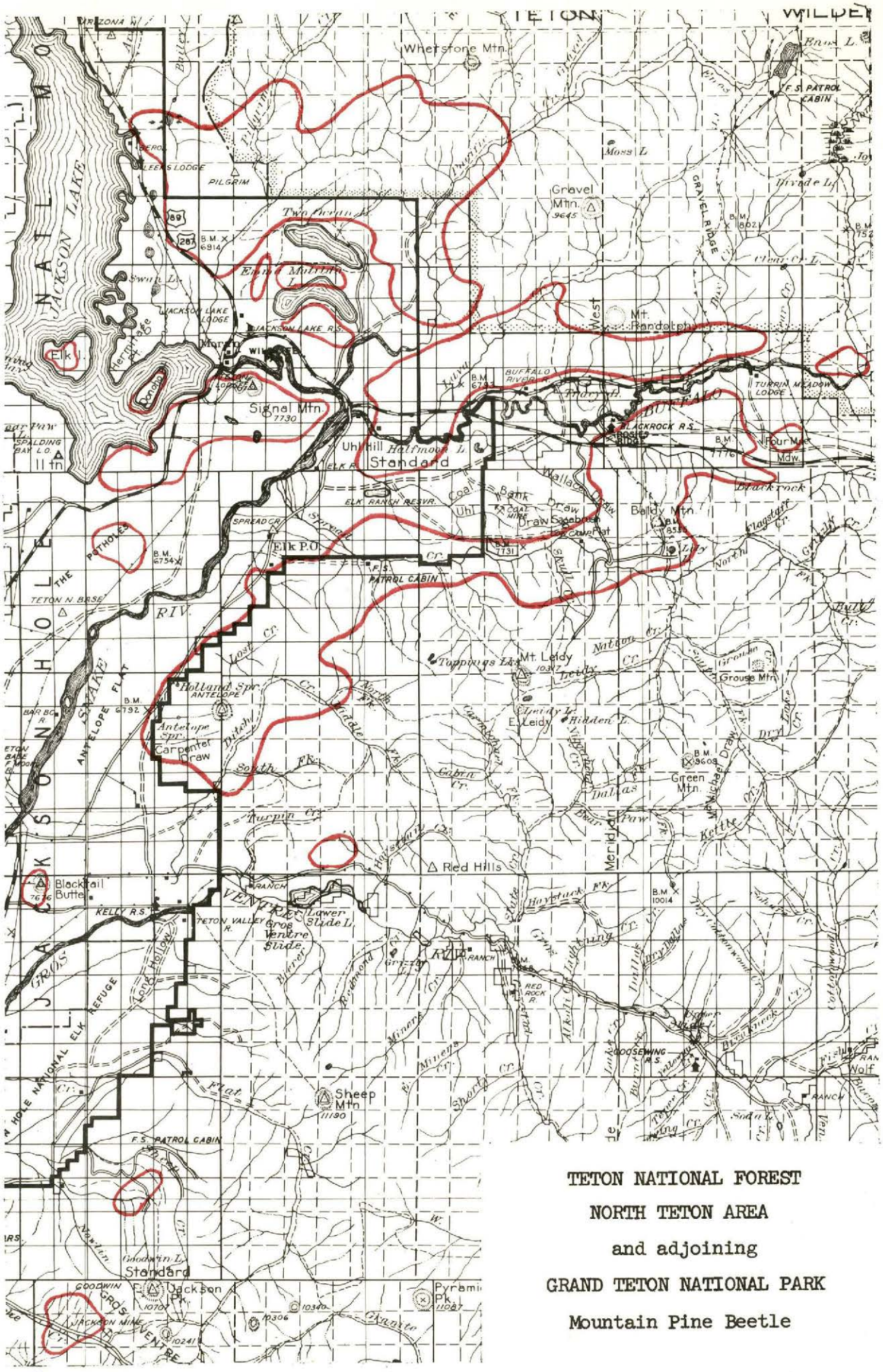
Epidemic conditions persist in West Shoal Creek. Attacked trees average 16.8 inches in diameter. According to the operational survey, there are 2,700 infested trees on 6,126 acres. Brood densities average 189.6 per square foot of bark, indicating the outbreak will continue at least at its present level for another year.

Much of the mature lodgepole pine has been killed in Jack Creek. The survey estimate is 2,436 infested trees on 629 acres. Approximately eight pitched-out trees were found for every successfully attacked tree. Many small diameter trees have been attacked, with many being only strip attacked. This infestation is still classed as epidemic, but the tendency is toward a decreasing trend. This change in the trend is probably due to depletion of host material.

Operational surveys show 9,388 infested lodgepole pine on 860 acres in the North Fork of Fisherman Creek. Attacked trees average 14 inches in d.b.h. The ratio of newly attacked trees to trees killed last year is one to one. Brood densities and attacks average 285.2 and 7.8 per square foot. The infestation is classed as epidemic with an increasing trend.

Three different areas infested with mountain pine beetle were sampled in and around Kismet Peak. Two areas evaluated were on Bureau of Land Management, State, and private lands. The other was taken on the west side of Kismet Peak on the Teton National Forest. Aerial and ground estimates show 10,000 to 15,000 infested lodgepole pine on approximately four sections of National Forest land. Another 10,000 to 15,000 infested trees are on Bureau of Land Management, State, private and National Forest lands. Brood densities average 285.0 per square foot of infested bark. Based on present information, the trend is increasing and the infestation has the potential to spread to a much larger area.

Some other areas which appear to be currently infested with mountain pine beetle were located during the aerial survey. These include Coyote Gulch with an estimated 400 trees, south of Hoback Guard Station 400 trees, Little Cliff Creek 100 trees, and Willow Creek about 1,000 trees. These areas have not been ground checked, but will be evaluated early next spring.



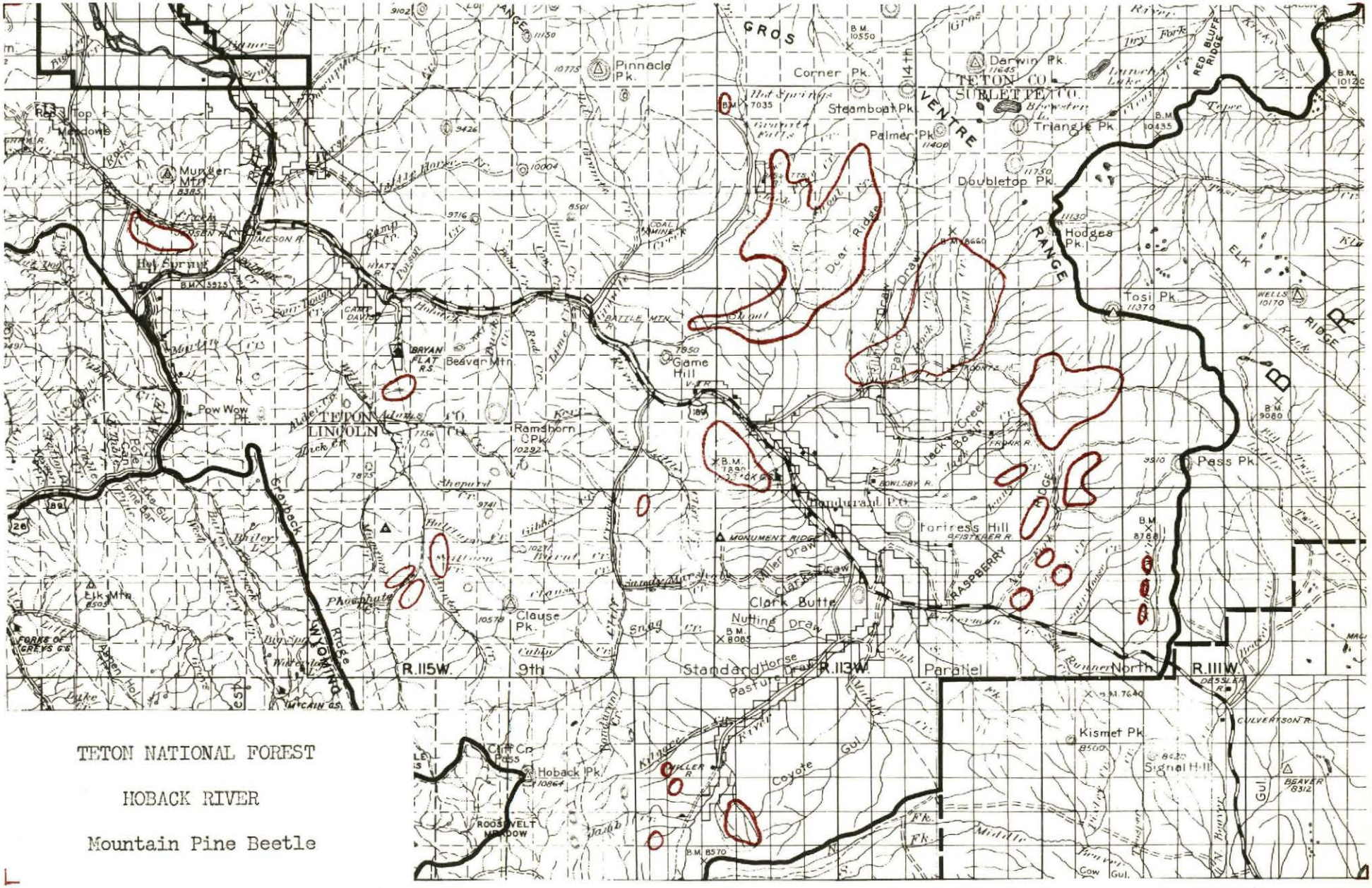
TETON NATIONAL FOREST

NORTH TETON AREA

and adjoining

GRAND TETON NATIONAL PARK

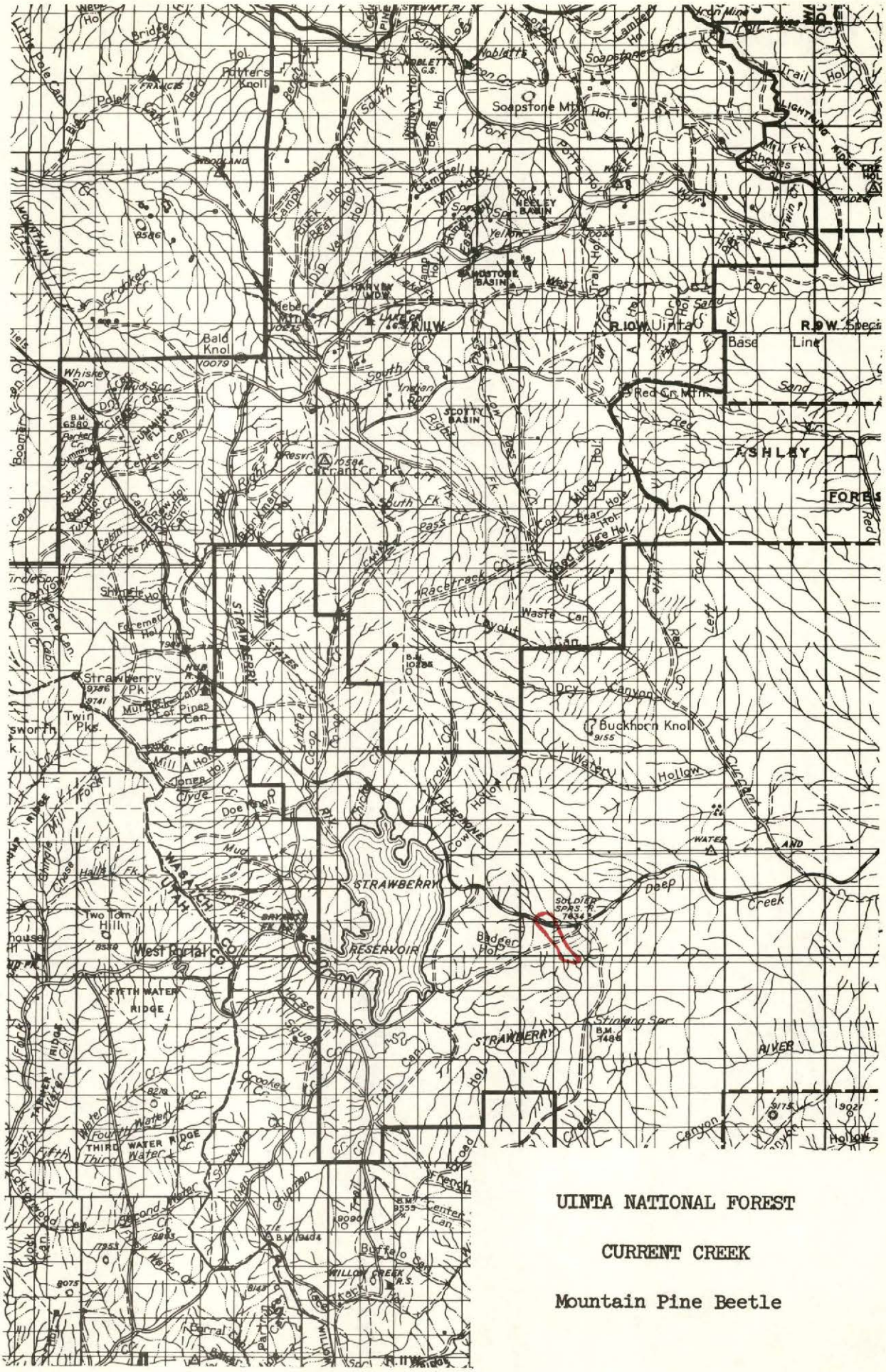
Mountain Pine Beetle


TETON NATIONAL FOREST
HOBACK RIVER
Mountain Pine Beetle
R.115W.
R.113W.
R.111W.
9th
14th
GROS VENTRE RANGE
SNAKE RIVER RANGE
Pinnacle Pk.
Corner Pk.
Darwin Pk.
Steamboat Pk.
Palmer Pk.
Triangle Pk.
Doubletop Pk.
Hodges Pk.
Tosi Pk.
Pass Pk.
Munger Mtn.
Hot Springs
Beaver Mtn.
Game Hill
Ramshorn Pk.
Clause Pk.
Elk Mtn.
Fortress Hill
Clark Butte
Nutting Draw
Standard Horse Pasture Draw
Paradise
Kismet Pk.
Sugarloaf Hill
Hoback Pk.
Cliff Cr. Pass
Roosevelt Meadow
Red Top Meadows
Pow Wow
Bryan Flat R.S.
Camp Davis
Battle Mtn.
Monument Ridge
Deer Ridge
Parcel Draw
Jack Brown Creek
Miller Draw
Clarks Draw
Raspberry Ridge
Red Bluff Ridge
Elk Ridge
Beaver Ridge
Coyote Gul.
Cow Gul.
Aspen Hollow
Phosphate Ridge
Grayback Ridge
Wyoming Range
Teton Co.
Sublette Co.
Lincoln Co.
Forks of Greys R.
Greys R.
Hoback R.
New Fork R.
Snake R.
Teton Pass
Wilson
Jackson
Alpine
Hamburger P.O.
Ramshorn P.O.
Paradise Valley
Fish Creek
Spring Gulch
Snow Creek
Granite Creek
Horse Creek
Bear Creek
Meadow Creek
Cottonwood Creek
Lake Gulch
Aspen Hollow
Phosphate Ridge
Grayback Ridge
Wyoming Range
Teton Co.
Sublette Co.
Lincoln Co.
Forks of Greys R.
Greys R.
Hoback R.
New Fork R.
Snake R.
Teton Pass
Wilson
Jackson
Alpine
Hamburger P.O.
Ramshorn P.O.
Paradise Valley
Fish Creek
Spring Gulch
Snow Creek
Granite Creek
Horse Creek
Bear Creek
Meadow Creek
Cottonwood Creek
Lake Gulch

Uinta National Forest

A mountain pine beetle outbreak in lodgepole pine in the Currant Creek drainage south of Heber, Utah has been present for several years. Infested trees have occurred mostly as singles in a mixed stand of lodgepole pine, aspen, alpine fir and Douglas-fir. Apparently last year an explosive buildup took place. The 1963 fall aerial survey detected over a thousand faded trees. During a ground evaluation, it was determined that approximately 2,000 lodgepole pine are now infested on about 500 acres. Eighty percent of the lodgepole pine trees above eight inches d.b.h. have been killed or are now infested. The infestation is classed as epidemic and increasing, with a buildup ratio of newly attacked trees to trees killed last year of a little more than one and a half to one. At the present time there are no factors which indicate a downward trend within the next year.

From the entomological viewpoint, control action will be necessary to prevent loss of many additional trees and spread of the infestation to adjacent stands of lodgepole pine. It may be possible to log some of the infested trees.



UINTA NATIONAL FOREST

CURRENT CREEK

Mountain Pine Beetle

Wasatch National Forest

On the Wasatch National Forest, there are two distinct areas of mountain pine beetle activity, (1) the North Slope infestation, and (2) the Provo-Weber River infestation. The lodgepole pine stands in these areas have a long history of beetle attacks against which various kinds and degrees of suppressive measures have been directed.

The North Slope project has been in operation since 1958. To date, over 500,000 infested trees have been treated. Treatment has included application of toxic chemicals, felling and burning, burning standing trees, and logging. This year, for the first time, all of the infested acreage was covered. A total of 78,349 infested trees were treated.

Estimates from operational surveys show there are now less than 19,000 infested trees within the boundaries of the North Slope project. The sizeable reduction in the number of infested trees appears to be due primarily to the continued control effort with some assistance from natural factors.

Biological evaluations of the North Slope project infestation during 1963 provided the following information: Spring brood density measurements showed the south end of the infestation had a larval density of 78 larvae per square foot of bark area. This brood density was three times as great as the number of parent beetles that attacked last fall. The larvae were nearly full grown, robust, and most were expected to survive through to adults and attack an increased number of trees this fall. Nearly all of these infested trees were treated before beetle flight.

In the north portion, most of which lies in Wyoming, the late spring evaluation found the bark beetle population averaged only about 40 per square foot, of which about five per square foot were pupae.

Most of the infested trees in this area had tight bark, and sampling was difficult. For the most part, the larvae were small and their development had been retarded. The tightness of the bark could well have been at least partly responsible for the apparent lack of vigor of most of the bark beetle brood. Treatment of the northern portion of the infestation was quite thorough, and it seemed questionable if the broods in the few missed trees could survive in sufficient numbers to continue epidemic conditions.

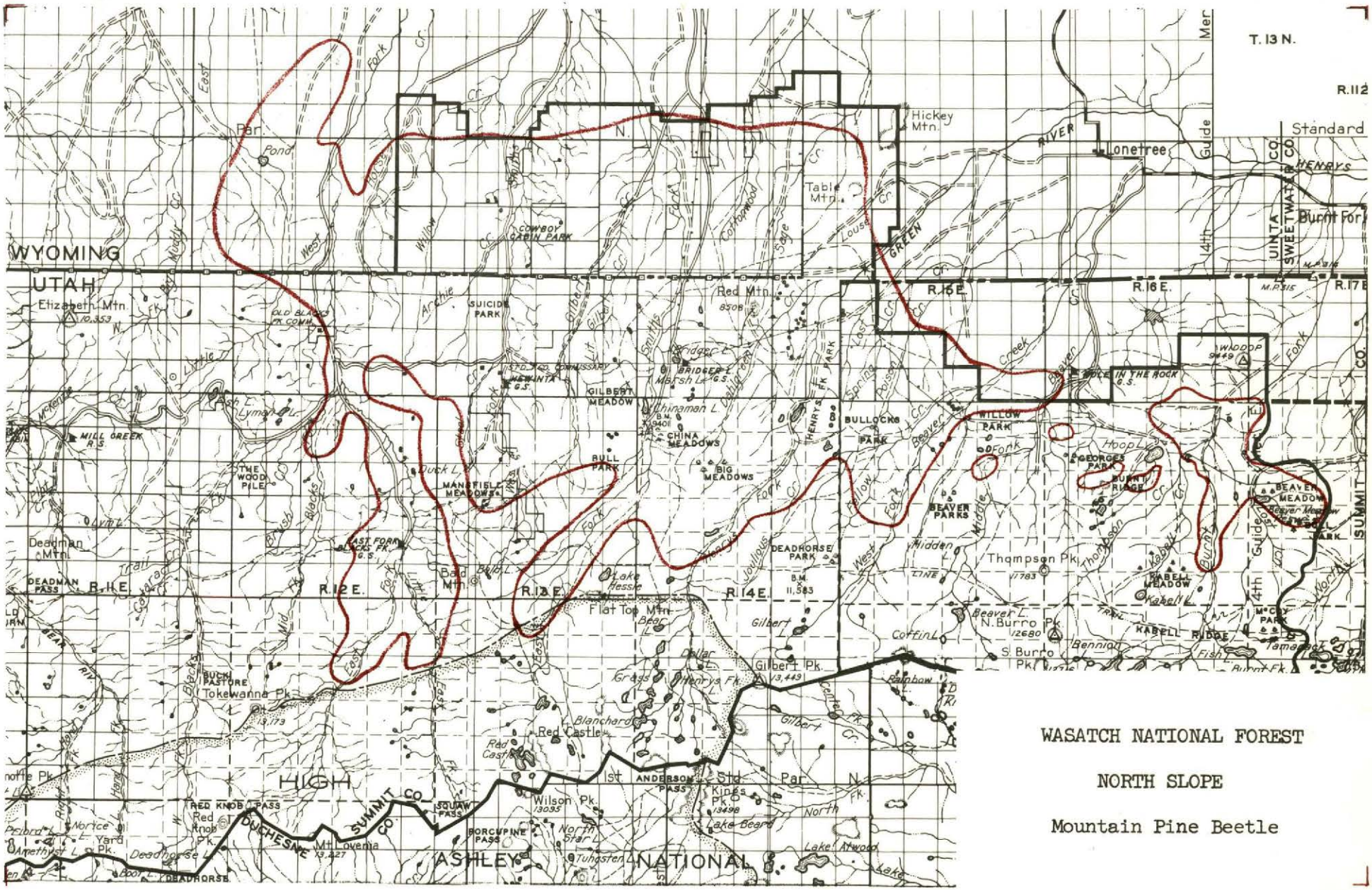
For the second straight year, the average fall brood density has been lower than believed necessary to perpetuate an infestation. Last year, the average brood density was 148.7, but some areas did have heavy brood densities. This fall, within the North Slope project area, brood densities averaged only 114.4 per square foot, and the hottest spot found had a density of only 151.2

In spite of the relatively low brood density and reduction in number of trees infested, the 19,000 trees now infested on the North Slope project should be treated to forestall a general buildup of the mountain pine beetle in this problem area.

The infestation on the Bear River shows an average brood density of 171.2, sufficient to sustain epidemic tendencies. The infestation in Stillwater Creek has the greater brood density and each pair of adults has produced nearly double the progeny of that produced by the parent adults in the infested trees west of the Bear River. The infestation on private land on the west side of the Bear River, however, has many more infested trees than found in the Stillwater drainage. Nevertheless, it is apparent the infestation at the mouth of Stillwater should receive at least as high priority for treatment as the west side of the Bear River.

Suppressive action carried on several years ago against the small spot infestations on the Weber River materially reduced the bark beetle population in that area. As far as we know, no epidemic concentrations are now present in the Weber River drainage.

The Provo River infestations are still present, but the epidemic characteristics in the canyon bottoms and one or two localized areas on the timbered benches have disappeared. Epidemic populations are still present, however, in and around Pitt and Page Hill, and between Iron Mine Mountain and Broadhead Meadows. The timber that contains concentrations of bark beetles in these areas has now been sold. Prompt removal of the infested trees and overmature timber within the sale areas should reduce the bark beetle population to a low level.



WASATCH NATIONAL FOREST

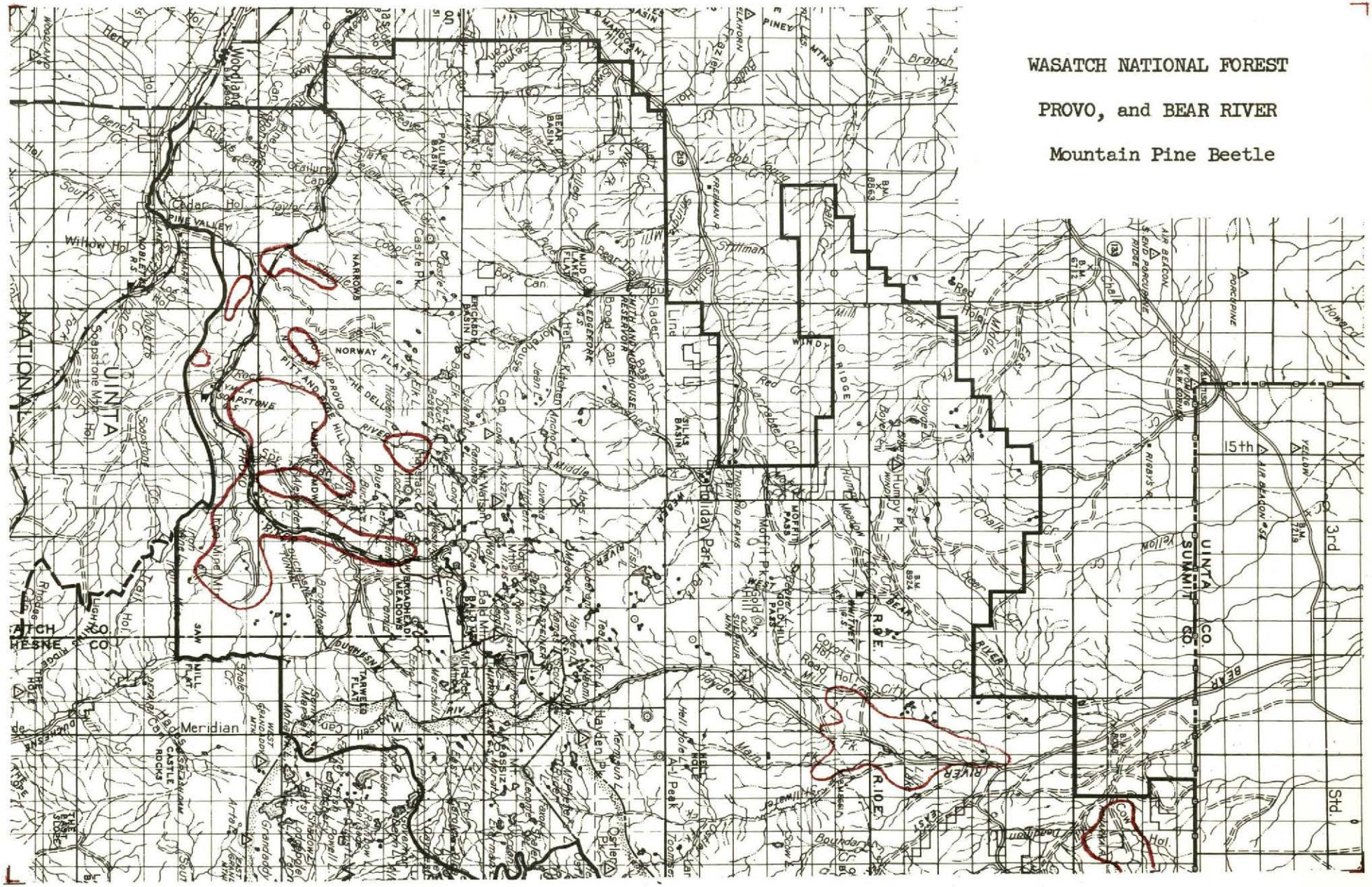
NORTH SLOPE

Mountain Pine Beetle

WASATCH NATIONAL FOREST

PROVO, and BEAR RIVER

Mountain Pine Beetle



DISCUSSION

All except two of the thirteen National Forests within the range of lodgepole pine in the U. S. Forest Service, Region Four, have at least one serious outbreak of the mountain pine beetle. The two exceptions, Salmon and Challis National Forests, have widely scattered small infestations, none of which appear serious enough to warrant control action. Outside the National Forests, the large infestation in Grand Teton National Park still shows an increasing trend; the infestation on private land south of McCall is nearly controlled; two large outbreaks on Bureau of Land Management, State and private lands, one in eastern Idaho south of Idaho Falls and the other in western Wyoming north and west of Daniel, have enlarged greatly.

Control action since 1958 on the North Slope project of the Wasatch National Forest has reduced the bark beetle population in that project area to a relatively low level. On the large outbreaks on the Targhee and Teton National Forests and the Grand Teton National Park, control has materially reduced the overall loss of timber. Several small infestations elsewhere have been successfully controlled by logging or chemical treatment. A few infestations show downward trends as a result of the influence of natural factors. The majority of the infestations, however, continue to be epidemic with increasing trends.

The infestations showing the greatest potential to increase in intensity and size are those on the Targhee, Caribou, and Cache National Forests and on the Grand Teton National Park, and the two noted above on the Bureau of Land Management, State and private lands. All of these infestations are in the northeastern part of the Region. Present bark beetle brood densities on most of these epidemic centers range from 240 to over 400 per square foot of bark area. Within this population, mortality through to emergence and attack next summer must exceed 90 percent before a reduction in bark beetle population will occur. It is highly unlikely that mortality of this magnitude will occur from natural factors. There is, of course, the possibility that small localized areas may be subjected to factors causing mortality above 90 percent, but unless it occurs over wide areas, it cannot be expected to change the present increasing trend of the majority of the bark beetle populations.

With this kind of prediction for the immediate future, the desirability of continuing or initiating suppressive action against these outbreaks might be open to question. In reality, however, unless control action is undertaken, these infestations can be expected to enlarge and increase in intensity rather rapidly. Thus, effective control action must be taken in an effort to reduce the overall bark beetle population and check the spread of the infestations. It should be noted that even with an all-out attack against these outbreaks, it is very possible

there will still be sufficient populations remaining next fall to attack many thousands of lodgepole pine trees. Without control action, however, the number of trees infested next fall would be much greater.

To illustrate the tremendous potential of the mountain pine beetle, a summary of data from the Teton National Forest follows: The average overwinter brood mortality last year in the nontreated infested trees was only 43 percent. The late spring brood was seven times as great as the number of parents that produced it. The fall brood density last year was smaller by a third than the present brood density. Still, the surviving brood was sufficient to cause a sizeable increase in the number of trees attacked. This year the attack density remained about the same as last year, but the fecundity of the parent females increased considerably. Looking to the future, if the fecundity of the females produced by the present generation equals or exceeds this year's rate of egg production, the potential of the bark beetle population will be even greater than indicated by the fall brood density. While the Teton National Forest data was used as the example, it fairly well represents the general picture of the infestation in the northeastern corner of Region Four.

Bark beetle population densities are not as heavy in the epidemic centers of northern Utah. Many infestations, however, do contain sufficient brood to show increasing trends, provided abnormal brood mortality does not occur before beetle flight next summer.

RECOMMENDATION

All epidemic infestations showing increasing tendencies should be subjected to some form of suppressive action, provided, of course, that resource evaluations justify such action. Continuation of the North Slope project is encouraged in order to further reduce the bark beetle population in this problem area.

Wherever control is to be undertaken, control plans should be prepared to insure complete coverage of all infested areas or entomologically-sound control units.

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